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Volume 27 JANUARY 1958 Number 1

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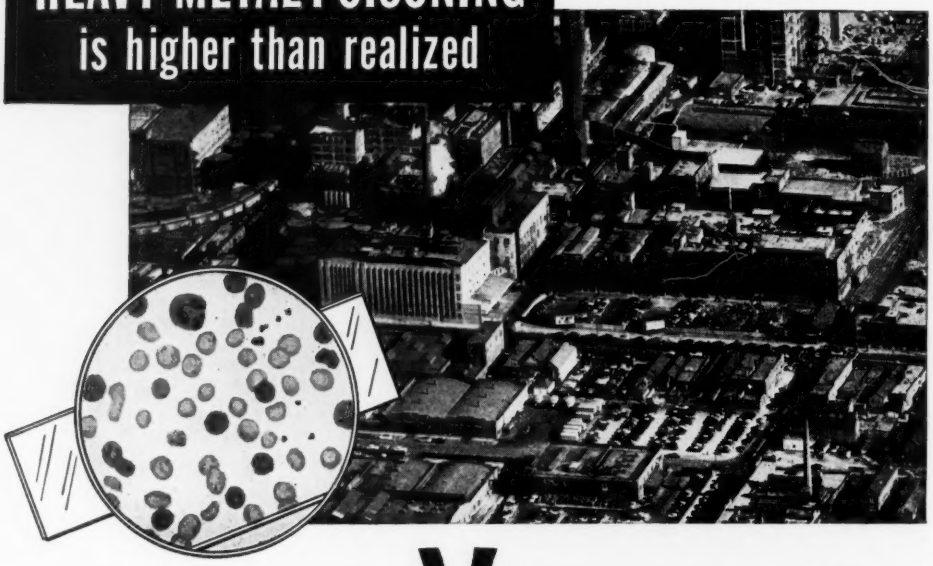

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The International Journal of Medicine in Industry

This Journal is dedicated to the advancement of sound industrial medicine, including the surgery of industrial trauma. To that end its varying contents will embrace scientific papers, reports, digests, news items and official statements, together with editorial comment. The editorial policy is to avoid undue censorship. Some contributions ably prepared will be published although contravening the personal opinions of the editors. Care will be exercised in checking the accuracy of known facts, as printed, but in all other respects statements and opinions are those of the author and may not be shared by the editors. On any article, the editors reserve the right to comment favorably or otherwise, in the current or any subsequent issue. On this basis, contributions are invited. The opinions expressed in any contributions, including the editorials of this Journal, do not necessarily reflect the attitude or opinions of any associated organization.

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INDUSTRIAL MEDICINE AND SURGERY

JANUARY, 1958

Medical Department Layout and Design

The Principles Underlying Industrial Medical Department Planning, and Their Functional Application

WILLIAM J. FULTON, M.D.
Detroit, Michigan

WE STOOD in a brand-new Medical Department. To the eye it was immaculate and quite modern. Seventy-five feet by 20, it was designed to serve 3000 employees in a manufacturing plant.

When operation began, things became apparent that had escaped the eye during that first casual inspection.

This Medical Department was oppressively narrow. The walls were penetrated by four doorways; two at one end from the Personnel and Employment Departments, one in the center from the factory, and one at the other end from the factory. The positioning of these doors created a convenient route for office personnel and factory employees between their job locations and the factory. They took advantage of this opportunity — as evidenced by a constant and uninterrupted three-way parade right through the center of the Medical Department. Patients came from all directions. There was no semblance of order. Doorways to operating and recovery rooms opened into a corridor so narrow that a stretcher-turn was impossible. Severely injured stretcher-bound persons, were treated on the corridor floor in plain view of all. Pre-employment examinations were conducted in one long room, floored with cold terrazzo, and equipped with five bare wooden chairs and an eye chart. That was all. Not even curtains between applicants. These were the chief items that became apparent. There were others. This was in 1935.

In 1942, the late Fred B. Wishard, M.D., of Anderson, Indiana, published an article containing certain observations pertinent to Medical Department layout and planning.[1] Some of his comments are well worth repeating here:

"Applicants for employment were conducted past employees being treated for wounds of all sorts; and the impression on the candidate was that this must be a bloody place to work. It was always our luck to have a lot of accidents on days when hiring was heavy, so that the people coming in were certain to see us at our best—or worst.

"Patients were received in one room, taken down a long hall to the x-ray room, where they removed such articles of clothing as the nature of the examination required, then had to dress before being taken elsewhere for treatment or further examination. The nurses were constantly walking from one end of the place to the other, so that an eight-hour tour of duty resolved itself into a sort of 'Bunion Derby.'

"We recognized that our (factory) production system had many features that were applicable to our own problems, such as elimination of repetitive motions, standardization of techniques, and

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1. WISHARD, FRED B.: "Processing Techniques in Physical Examination." *Indust. Med.*, 11:6, 253 (June) 1942.

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other features that would increase our efficiency.

"Another problem was that of *individual*, rather than collective, examinations. When several men are stripped in one large room, they resent the lack of privacy. While curtained booths help somewhat, they do not fully solve the problem. A solid door has a certain psychological value; even though there may be others on the other side, the closed door insures privacy. The average applicant is frequently a bit confused and apprehensive. If he is made to wait any great length of time, is greeted in a brusque manner, or treated roughly, he at once gains an unfavorable impression of the Medical Department and of the employer it represents, for quite frequently the only contacts an employee has with management are his foreman and the doctor. If we start a man off right, we seldom have much trouble with him later."

While the foregoing observations cover a span of 23 years, oddly enough, in large and small industrial Medical Departments that are being built today the same errors are consistently repeated.

Some of the possible causes that may affect the extent to which this statement is true are:

1. Material and data which would serve as a guide in the functional layout planning of industrial Medical Departments seem to be non-existent. At least we have been unsuccessful in finding materials or data that lay down fundamental principles based on an analysis of the character, type, time-requirement, and volume of the "jobs" performed. Lack of such educational material limits the number of industrial physicians and nurses who possess the knowledge and ability to plan a Medical Department with any degree of efficiency.

2. Many layout plans of all sizes, and articles concerning individual department layouts, with dimensions and equipment lists are available. Dimensional, facility, and content requirements, as forwarded to architects, are in abundance. Rarely, if ever, are any of these accompanied by specifications concerning the placement of the various facilities in accordance with their functional relationships. An architect, taking for granted that a layout designed some time ago for Factory "A" has proved entirely satisfactory, may repeat this same plan when commissioned to design one of like area for Factory "B." The same functional errors, long since recognized by the professional staff of Factory "A," become immediately obvious to those operating Factory "B" when it begins work. Through some failure in communications or follow-up, the architect had never learned of any deficiencies.

3. In many instances the industrial Medical Department is designed and installed without benefit of professional consultation during the planning stage, and before an industrial nurse or physician is engaged to operate it. The omissions may account for repetition of errors in functional design.

Following the presentation of our subject to various groups, many letters have been received. The following paragraph, written by a colleague in Missouri, is typical of most of these letters: "I am vitally interested in the information you presented, having been involved in the difficulties that go with medically uninformed contractors and dogmatic architects of industrial plants."

It might seem that our colleague is generally critical of contractors and architects. This is far from the case. The highlight of his criticism, if any, is that they were "medically uninformed." After all, few architects or contractors operate the machines or work in the quarters they design or build. The experience and observation of those who *do* operate and work in industrial Medical Departments, furnishes the logical source of practical medical information which might be useful to architects and contractors, who serve those particular needs. Our source is a 20-year collection of this type of material. Our conclusions are based on analysis of the "jobs" performed in industrial Medical Departments, and on studies of the time and motion involved. The purpose is to furnish useful information, and to establish some of the basic fundamentals involved in the planning and efficient administration of industrial Medical Departments. While such established criteria should be permanent in principle, they should also be capable of adaptation to changing trends in architectural style and interior decorative design.

A thorough knowledge of these fundamentals will be of value to industrial physicians and nurses engaged in full- or part-time industrial practice in the following ways:

1. In advising managements concerning proposed plans submitted to them for edit.
2. In planning a new Medical Department.
3. In altering or adding to a Medical Department.
4. In making clear to the architectural profession the particular requirements of an industrial Medical Department and the need for specific functional layout.

AN INDUSTRIAL Medical Department is a tool. A tool will best accomplish its purpose if it is designed to do a specific job. Job planning and time and motion study are as important to the efficient administration of a Medical Department as they are to the efficient operation of any production department.

In order to plan a Medical Department, the following facts should be known:

1. Number of persons to be served.
2. Number of shifts, and number of employees working on each shift.

3. The scope and type of medical services to be rendered.

4. The character of the employees' occupations.

5. The general layout of buildings and working areas.

6. The policies of the management.

Having ascertained these facts and the objectives, the following are the Cardinal Points that should be taken into consideration in every phase of our planning.

CARDINAL POINTS:

1. QUALITY: Medical layout, environment, and service should be pointed toward gaining the respect and confidence of each and every employee. Layout and facilities should abet individual attention, and maintain individual privacy and dignity. Layout should be adaptable to modern techniques in treatment and diagnostic procedures.

2. QUANTITY: Application of the principles of the Flow-Chart, Time and Motion Study, and Job Analysis, toward insuring efficient and economical administration without sacrificing quality. All allotted space should be designed to produce maximum usage.

3. ASEPTIC TECHNIQUE: Layout and procedure that will prevent contagion, contamination, and secondary infection.

4. WORKING ENVIRONMENT: Good working and daily living environment for members of the medical staff.

5. CIVILIAN DISASTER: Adaptability to emergency conversion and service in the exigencies of civilian defense, or disaster. The widespread locations of industrial Medical Departments may make any one or all of them vital links in the chain of services urgently needed under such circumstances.

As to the location of the Medical Department in relation to all other departments, certain points are desirable:

LOCATION:

1. As near the center of population of the people it is to serve, as is practical.

2. Adjacent to the Employment Department and convenient to the Safety and Personnel Departments.

3. Accessible to supervision.

4. Convenient to an inconspicuous, extra-factory exit. Under no circumstances should the main medical facilities be in a position that would allow their entrapment by internal fire or explosion.

FROM this point on, our subject is presented in four sections:

SECTION I:

Analysis of the work performed by the industrial Medical Department, and classification of its functions. Conclusions are derived from this analysis which are fundamental to the efficient planning of a department.

SECTION II:

The material and conclusions in Section I are applied to a proposed layout plan submitted to the Medical Department for edit and comment, before approval by management.

SECTION III:

Reconstruction of the proposed plan. Application of the principles of Functional Layout derived from Section I.

SECTION IV:

VARIOUS SIZE LAYOUT PLANS — Demonstrating that the fundamentals derived from Section I can be applied to advantage in the planning of industrial Medical Departments of any size.

Section I
Principles of Functional Layout

THE FUNCTIONS of an industrial Medical Department fall into two distinct classifications:

1. EXAMINATION FUNCTIONS.
2. TREATMENT FUNCTIONS.

There are three types of procedures or "jobs" involved in the Examination Functions; two in the Treatment Functions.

Classification of Functions

THE COMPLETE classification of the functions of a Medical Department is as follows:

1. EXAMINATION FUNCTIONS:

1-A. *Pre-employment Placement Examination.*

1-B. *Periodic, Occupational, and Health Maintenance Examinations.*

Types classified in 1-B are twofold in purpose, preventive in principle. Their purpose is to prevent injury or sickness among employees engaged in occupations that are known to be hazardous; and, through diagnostic procedures, maintain good health and prevent disability through the early detection and treatment of disease.

These examinations are usually done during working hours on a routine appointment time schedule.

1-C. *Special Consultations.*

This type of examination function has three principal origins:

(a) The employee asks to see the physician because of some personal symptom or complaint.

(b) Through one or a number of contacts by an employee with the Medical Department, the nurse, functioning as a screening agent, picks up sufficient information to warrant referring the employee to the physician.

(c) The accumulated record of an employee indicates to the clerk or nurse, the advisability of reference to the physician.

All of these cases eventually arrive in the pri-

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vate office of the physician. Many of them require technical diagnostic procedures over and above what can be performed by the physician in his office. Another proportion require some temporary care or medication, such as a throat to be mopped, a boil opened, a dressing to be changed. Facilities and equipment to meet such contingencies should be reasonably close at hand.

One group of facilities is sufficient to handle all phases of the Examination Functions.

2. TREATMENT FUNCTIONS:

2-A. *Minor Treatment.*

This includes the initial and subsequent care, treatment, and recording of minor injuries and sick complaints. Also included is the "check-in" of those absent because of illness or injury. It might seem that this latter procedure is an examination function, however, the majority of these cases are processed in the minor treatment area. The extremely rare case that involves physician or examination facilities will automatically be scored under Function 1-C.

2-B. *Major Emergency.*

The initial care, treatment, and transportation of traumatic and medical emergencies.

The sharp contrast in the character of these two treatment functions, makes it obvious that a separate group of facilities should be designed to handle each. Regardless of classification, each of the various functions represents an individual personal contact.

Analysis of Medical Contacts

THE PROPORTION or percentage of each of these classifications, as related to the total number of contacts is as shown in Table I.

The percentages in Table I represent the average of total data derived from a number of plants over a 17-year span. As a basic estimate to be used for purposes of planning, these percentages will hold generally true. There are, of course, variations in such percentages from time to time.

Source of Medical Contacts

WHAT is the source of medical contacts? From the foregoing percentages, it is obvious that the great majority originate in the *working area. All* pre-employment examinations originate in the Employment Department. An occasional contact originates in the Personnel Department. For purposes of planning, the following will serve as a reliable general estimate:

(a) 92% to 94% of all medical contacts originate in the working area. (b) 8% to 6% originate in the Employment and Personnel Departments.

TABLE I.
ANALYSIS OF MEDICAL CONTACTS

1. EXAMINATION FUNCTIONS:		
1-A. Pre-employment	6.2%	
1-B. Periodic, Occupational and Health Maintenance	1.2%	
1-C. Special Consultations	1.4%	
Total		8.8%
2. TREATMENT FUNCTIONS:		
2-A. Minor Treatment	90.1%	
2-B. Major Emergency	1.1%	
Total		91.2%
TOTAL ALL CONTACTS		100.0%

Contrast in Types of Cases

THERE is a sharp contrast in the types of service needed in the in-plant practice of occupational (industrial) medicine. This contrast is between services to MANUFACTURING and NON-MANUFACTURING occupations, sometimes referred to as productive and non-productive. Broadly defined, a manufacturing occupation is one in which "the making or production of anything involves predominently the use of machines, tools, and much physical labor." In contrast, non-manufacturing occupations involve a minimum of the above, ranging from executive assignments to activities of an apprentice. Broadly defined as "white-collar" occupations, examples would be stenography, filing, drafting, mailing, and switchboard operation.

In manufacturing occupations (Table II), the proportionate number of contacts due to injury is always higher; in this analysis it is 54% of the total, in contrast to only 10% in non-manufacturing. The emergencies encountered are predominently traumatic, or surgical, while in non-manufacturing occupations, emergencies are predominently medical (due to sickness). The proportionate number of contacts due to sickness predominates in non-manufacturing occupations, in this analysis making up 83% of the total, in

TABLE II.
COMPARATIVE DEMAND FOR TYPES OF MEDICAL SERVICE

	MANUFACTURING OCCUPATIONS	NON-MANUFACTURING OCCUPATIONS
New Injuries	34 %	3 %
Retreatment	20 %	7 %
Total Traumatic	54%	10 %
Sick Complaints	39 %	83%
Examinations	7 %	7 %
	100 %	100 %
Emergencies Predominantly-	TRAUMATIC	SICKNESS

contrast to 39% in manufacturing industry.

To be sure, the "white collar" workers do get hurt now and then. Staples, addressographs, file drawers, pencils, sharp paper edges, are some of the instruments. Falls occur. Foreign bodies get in eyes. For the most part, these instances are minor, and a large proportion of them are nonoccupational, having occurred away from the place of work.

In planning a Medical Department, this contrast in types of cases is chiefly important in regard to the quantity and type of materials, drugs, instruments and equipment to be installed and used. IT DOES NOT AFFECT THE BASIC FUNCTIONAL FLOOR LAYOUT. The same layout will serve both types of occupation equally well.

Another contrast should be mentioned in passing. Manufacturing occupations have more "messy operations" and produce a greater number of greasy, tarry shoes and hands, and soiled uniforms. Fabric floor covering and upholstery, along with similar types of interior furnishings, do not take kindly to this type of exposure. Floors and furnishings that are easy to keep clean are better in appearance and less costly to maintain.

TABLE IV.

	Function 1-A Pre-Employment Examinations	Function 1-B Occupational Periodic Examinations	Functions 1-C, 2A, & 2B All Other Visits	Total All Visits 100%
January	2.1 %	1.2 %	96.7 %	17,321
February	1.5	2.3	96.2	17,526
March	7.0	1.4	91.6	19,441
April	11.4	1.2	87.4	22,876
May	7.8	1.1	91.1	19,555
June	6.5	1.4	92.1	20,324
July	2.3	.9	96.8	7,110
August	19.9	.6	79.5	16,196
September	11.8	.6	87.6	25,491
October	8.0	1.0	91.0	26,163
November	5.5	1.8	92.7	19,910
December	8.7	1.0	90.3	25,026
Total Year	8.16%	1.29%	90.55%	236,939

The Pre-employment Examination (Function 1-A)

OFTEN a condition of employment, the candidate having this service thrust upon him, finds himself in unfamiliar surroundings; a stranger within our medical gates. It is during this initial contact that lasting impressions of the medical quarters, service, and staff, and of the employer, take shape.

The demands for numbers of pre-employment examinations are more variable than demands for any other medical service. The sudden "ups and downs," under pressure and relaxed periods, are characteristic and their features are unique. This is especially true of manufacturing occupations. There are a number of influencing factors. Changing production schedules, labor turnover, quit rate, expansion, and financial depression, are among these factors. The data in Tables III and V illustrate this variation in demand on a year-to-year basis.

TABLE III.

		Function 1-A Pre-Employment Examinations	Function I-B Periodic and Occupational Examinations	Functions 1-C; 2-A; 2-B All Other Contacts
NEW PLANT	1935	17.7%	0.0%	82.3%
	1936	2.9%	4.3%	92.8%
	1937	1.7%	2.1%	96.2%
DEPRESSION	1938	.6%	2.0%	97.4%
	1939	2.9%	3.5%	93.6%
	1940	1.4%	3.5%	95.1%
	1941	2.0%	2.7%	95.3%
WAR CONVERSION	1942	12.6%	0.0%	87.4%
	1943	6.6%	1.7%	91.7%
	1944	3.6%	1.6%	94.8%
	1945	3.7%	1.4%	94.9%
AVERAGE 11 YEARS		5.0%	2.0%	92.86%

TABLE V.
PERCENTAGE RELATION OF THE PRE-EMPLOYMENT EXAMINATION TO THE TOTAL OF ALL HOSPITAL VISITS
ANALYSIS OF 70,764 EXAMINATIONS; 1,275,392 VISITS

	One Factory	Six Factories Widespread Locations	Combined
1947	7.17%		7.17%
1948	5.71%		5.71%
1949	10.48%	5.68%	8.08%
1950	5.11%	3.65%	4.38%
1951		3.61%	3.61%
1952		8.16%	8.16%
Four Years	7.11%	5.18%	
Six Years			6.18%

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The 1952 data of the six factories in widespread localities that appear in Table V, are also presented in Table IV to illustrate the month-to-month variations.

These six factories had an average employment of 15,754 in 1952.

The medical records account for:

19,357	Pre-employment Examinations.
3,057	Occupational and Health Maintenance Examinations.
214,525	All other types of visits.
236,939	Total all individual contacts.

The month-to-month variation in the demand for Pre-employment Examinations is obvious. In August (19.9% — RED) the demand was 13.5 times greater than in the low month of February (1.5% — GREEN).

Daily variations are equally dramatic. For example:

	Per Day	Total
(a) September (11.8%)		
All plants averaged	139	3,028
Low plant	2	32
High plant	54	1,221
(b) February (1.5%)		
All plants averaged	13	269
Low plant	0	0
High plant	12	125

(The plant that was lowest in February, was not lowest in September.)

There are times when the day-to-day variation is sudden and extreme. It is not unusual for a department averaging from five to 10 examinations per working day, to be called on to do from 50 to 100 pre-employment examinations, tomorrow.

This characteristic, unique to the Pre-employment Examination Function (1-A), is of importance in planning a Medical Department from two points of view:

(a) The layout of facilities to serve the Examination Functions, should be adaptable to these demands for great numbers of rapid Pre-employment Examinations. To meet such contingencies, a layout should be capable of immediately making available the necessary tools (facilities) to enable additional staff personnel to function smoothly and efficiently. Extra physicians, nurses, and technicians may be needed. It goes without saying that such additional help would be tremendously handicapped should adequate quarters, facilities, and tools be lacking.

(b) During periods when there is little or no demand for Pre-employment Examinations, these facilities should be capable of consistent usefulness in carrying out other functions. Planned for quantity, the style should not be so cramped as to curtail quality. Too often, facilities, efficient for rapid streamlined examinations, are too limited and bare to serve other purposes; or, if used, lend nothing toward a good environment for patient or medical staff.

In Table IV, note the decrease in the relative number of Occupational and Health Maintenance Examinations (Function 1-B) in months when the percentage of Pre-employment Examinations shows an increase (Function 1-A). The highest percentage in each of these two columns is colored RED, the lowest GREEN. This tendency or trend may indicate one of three things:

1. Facilities are inadequate to maintain a consistent rate of the Preventive and Health Maintenance Functions classified as 1-B.
2. There is insufficient Medical Department manpower.
3. Facilities are monopolized by demand for extraordinarily high numbers of Pre-employment Examinations.

Time Spent in The Medical Department

TO SET DOWN a figure that would serve as a dependable standard for average time spent in the Medical Department by the recipients of all services classified as Examination Functions, would be next to impossible. Too many variable factors are involved to permit a general estimate.

We will venture a figure of 34 minutes as a MINIMUM average standard time spent in the department by candidates undergoing the PRE-EMPLOYMENT-PLACEMENT EXAMINATION (Function 1-A). This 34 minutes assumes that the department has personnel adequate to maintain an uninterrupted flow of examinations, without any waiting time before beginning a procedure. Thirty-four minutes will allow a questionnaire history, weight, height, far and near vision test, obtaining blood and urine specimens, chest x-ray, and general procedures, sufficient to insure safe placement. It should be clearly understood that 34 minutes is the elapsed time between entrance and exit of the candidate. Addition of the times spent by individual, professional, technical, and clerical personnel in completing all phases of such an examination would exceed 34 minutes.

Special Features of the Treatment Functions

THE DATA in Table I point out the fact that the Treatment Functions make up the great majority of individual contacts, constituting 91% of the totals of all visits. While the number demanded will vary from day to day, it is never subject to such sudden drastic increases as the 135% variation in demand for Pre-employment Examinations exhibited in Table IV. The variation in the number of Treatment Functions rarely exceeds 30% above or below the average daily number of cases in any one month. The one factor (other than a local disaster) that can cause a sudden dramatic rise is the occasional though rare epidemic of some form of sickness. We have chosen data of the year 1943 to demonstrate the

TABLE VI.
TREATMENT FUNCTIONS

MANUFACTURING OCCUPATION

1943	AVERAGE NUMBER OF EMPLOYES WORKING	DAILY AVERAGE NUMBER OF CONTACTS		MONTHLY (SEVERITY INDEX)	
		INJURY	SICK	TOTAL SENT HOME SICK	RATIO OF SENT HOME SICK TO TOTAL SICK CONTACTS
January	3489	116	86	48	1:42.8 Low
February	3415	108	65	50	1:31.1
March	3338	99	63	46	1:37.3
April	3146	89	51	51	1:27.0
May	3419	101	54	68	1:21.9
June	3455	112	67	54	1:32.4
July	3584	122	72	83	1:23.5
August	4417	137	90	88	1:26.6
September	5017	150	114	79	1:37.5
October	5158	172	122	97	1:32.6
November	5226	186	139	89	1:40.7
December	5023	137	164	270	1:15.7 High
YEAR	4058	128	91	1023	1:27.6
EXAMPLE OF EXTREME DAILY VARIATION DUE TO EPIDEMIC					
Saturday, Dec. 4th		146	127	6	1:21.1
Monday, Dec. 6th		130	234	31	1: 7.5
Tuesday, Dec. 7th		135	207	34	1:6.0

variation in the demand for Treatment Services; because, over a day-by-day record covering, a period of 20 years, 1943 contained the highest range of variation, and an epidemic, recognized nationally, occurred in December of that year.

These data represent manufacturing type medium industry, on a multiple-shift, six-day week.

Number of employees — year 1943:

	Hourly	Salary	Total	%
Men	1614	660	2274	56%
Women	1457	327	1784	44%
Total	3071	987	4058	100%

Medical Service Record — year 1943:
Examination Functions ..... 5,779 — 7%
Treatment Functions
(Direct Service) .....79,461 — 93%
Total Individual Services ....85,240 — 100%
Man-hours Worked — 9,977,322: Days Worked — 311

The monthly data for 1943 appear in five columns in Table VI. Note in the first column that during the year there was an increase in the number of employees, from a low of 3,146 in April, to 5,225 in November. This represents an over-all increase of 2,080 employees. The data in the second and third columns are obtained by dividing the monthly totals of the respective services by the number of days worked each month. Note the rise in the daily average number of sick complaints in December to 164 (RED), an increase of 18% above the average number of 139 in November.

To illustrate the daily variation, the record for three consecutive working days is placed at the bottom. The jump from 127 sick complaints on December 4 to 234 on December 6 is an extreme example. This represents an 84% increase over the 127 cases of the previous working day.

The data in the two right-hand columns constitute a measure of the disabling quality (or severity) of sickness as it is encountered in industry. To a degree it also underlines the statement that an occasional epidemic is the one factor that can cause a sudden dramatic rise in the demand for the treatment functions.

In the fourth column appear the actual number of persons who, in the opinion of the medical staff, were sick enough to be sent home from work. The far right column contains the ratio of the number sent home to the total number who registered sick complaints. For example, during the 311 days worked in 1943, 28,274 persons registered sick complaints. Included in this number were 1,023 (year — column 4) who were sent home sick. Dividing 28,274 by 1,023 gives us 27.6 (year — column 5). The severity of sickness during 1943 may be expressed as 1:27.6, or "for each 27.6 sick complainers, *one* was sick enough to be sent home." We have named this ratio the *Medical Severity Index*. Followed on a

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day-to-day basis for 20 years, it has proved to be a remarkably dependable measure of the disabling quality of illness among the general population. The consistent trends exhibited over those years have yielded forewarning signals of impending pandemic and of unusually high rates of absenteeism in industry due to *real* sickness. In this particular instance it is presented to demonstrate the effect of epidemic illness upon the demand for treatment function services in industrial medical practice.

The Severity Index for each month appears in the far right column. January, with an index of 1:42.8 (GREEN), experienced the lowest rate of disabling sickness during the year. Month-to month variations occurred during the year, culminating in the drastic increase to a ratio of 1:15.7 (RED) in December. This represents an increase in severity of 159% above the ratio of 1:40.7 in November. Increase in the number of people sick enough to be sent home during December is equally dramatic. Two hundred and seventy (RED — column 4) is triple in number, and 203% greater than the 89 sent home during November.

As denoted by the record of three consecutive working days, severity took the greatest day-to-day jump on Monday, December 6, when 31 persons were sent home in contrast to the six sent home the previous Saturday. The epidemic responsible for this increase reached its peak in numbers of sick complaints on that day. The peak in severity was reached the following day, as denoted by the RED figures on the bottom line. Thirty-four persons were sent home, a ratio of one out of every six complainers (1:6). While the majority of sick complaints are minor in character and the patients ambulatory, a sudden rise in severity, such as this, produces a greater proportion that will tax the Emergency Facilities and require transportation. Such was the case here when, on two consecutive days, 31 and 34 persons were sick enough to be sent to home or hospital.

Recorded experience such as the foregoing demonstrates what can be expected, and what does happen; and hence is of value and should be borne in mind when planning an in-plant medical facility.

Predicting the Number of Treatment Function Cases

IF ONE KNOWS the number of people working, the average daily number of treatment cases that number will produce can be predicted with dependable accuracy.

Analysis of data covering a 10-year period led to this conclusion: "In MANUFACTURING industry people who have free access to an established medical dispensary will produce one Direct Service visit per shift for each 15 people working. This is an ANNUAL daily or shift average." Records covering eight consecutive years, in one instance, show the highest annual ratio to have been 1:14.70 per shift; the lowest 1:15.85. A medical colleague furnishes a six-year record showing a range from a high of 1:14.5 to a low

TABLE VII.

1943	DAYS WORKED ÷	TOTAL CONTACTS CLASSIFIED AS TREATMENT FUNCTIONS (DIRECT SERVICE) =	AVERAGE NUMBER OF CONTACTS PER DAY ÷	NUMBER OF EMPLOYES WORKING =	RATIO OF CONTACTS PER DAY TO TOTAL EMPLOYES WORKING
January	24	5513	229	3489	1:15.2
February	24	4873	203	3415	1:16.8
March	27	5019	186	3338	1:17.9
April	27	4325	160	3146	**1:19.6**
May	26	4762	183	3419	1:18.6
June	26	5350	206	3455	1:16.7
July	27	5963	221	3584	1:16.2
August	26	6909	265	4417	1:16.6
September	26	8013	308	5017	1:16.2
October	26	9088	349	5158	1:14.7
November	26	9832	378	5226	1:13.8
December	26	9814	377	5023	**1:13.3**
YEAR	311	79461	255	4058	1:15.9
Sat. Dec. 4th - Actual Number Contacts 306				5023	1:16.4
Mon. Dec. 6th - Actual Number Contacts 499				5023	1:10.0
Mon. Dec. 13th - Highest Single Day **588**				5023	**1:8.5**

of 1:15.2 The extreme annual variation within the 14-year record is from the highest of 1:14.5 (3.3% ABOVE 1:15) to the lowest of 1:15.85 (5.5% BELOW 1:15).

In Table VII, data from 1943 are arranged to illustrate the month-to-month variation in the 1:15 Treatment Function rate. Beginning at the left, the number of days worked each month is divided into the number of contacts classified as Treatment Functions (direct services). This yields the average number of such contacts per working day each month. Dividing this daily average into the number of people known to be working, yields the ratio that appears in the far right column. The ratio of 1:13.3 (RED) in December is the highest monthly rate; 1:19.6 (GREEN) in April is the lowest. Comparing these two extremes with our proposed ANNUAL standard ratio of 1:15, we exhibit a range of month-to-month variation from a low (April — 1:19.6) which is 30.6% BELOW 1:15, to a high (December — 1:13.3) which is 11.3% ABOVE 1:15.

The record of December 13, appearing below, is of some interest. While the epidemic reached its peak in sick complaints on December 6, the highest single day in the year occurred one week later on December 13 with 588. It so happened that 213 of these 588 were victims of the epidemic returning from sick absences.

Considering these year-to-year data, and the month-to-month data in a year so unusual as 1943, the range of variations above and below 1:15 is sufficiently small to warrant the following conclusion:

FOR PURPOSES OF PLANNING, THE RATIO 1:15 MAY BE USED WITH CONFIDENCE AS A PREDICTER OF THE DAILY AVERAGE NUMBER OF TREATMENT FUNCTION CASES A GIVEN NUMBER OF PEOPLE IN A MANUFACTURING OCCUPATION WILL PRODUCE.

Example: 1,560 employees — MANUFACTURING occupation:

1,560 ÷ 15 = 104 — average daily load of cases classified as Treatment Functions (direct services).

Note that MANUFACTURING is emphasized.

In the case of NON-manufacturing (white collar) occupations, the author does not possess sufficient data to warrant a conclusion with the same degree of confidence. Data in my possession cover only six years, the daily average ratio of cases to employees varying from 1:31.3 to 1:74.6. I am indebted to Wm. Jend, Jr., M.D., Medical Director of the Michigan Bell Telephone Company, for furnishing data covering 5,000 employees for the year 1956. His department experienced a ratio of 1:71.8 per working day. From these limited data, I would conclude that when planning medical facilities to serve groups of from 1,000 to 5,000 employees engaged in NON-manufacturing occupations, the ratio of 1:50 will prove reasonably accurate for predicting the average daily load of cases.

Example: 1,560 employees — NON-manufacturing occupation:

1,560 ÷ 50 = 31 — average daily case load.

These ratios are chosen as measuring factors because they are easy to use. Simple division is the only mathematics required. It is hardly necessary to point out that percentage could likewise be used — 1:15 being the equivalent of 6.666%, and 1:50 the equivalent of 2%.

Examples:

Manufacturing — 6.666% of 1,560 = 103.9896.

Non-Manufacturing — 2.% of 1,560 = 31.20.

Types and Quantities of Treatment Function Cases

TWO CHIEF types are encountered:

1. Those pertaining to the initial and subsequent treatment of real or alleged trauma (injury).

2. Those pertaining to sick complaints and symptoms.

TABLE VIII.
INJURY

BODY PARTS	PERCENT OF TOTAL	PROGRESSIVE TOTALS			PERCENT OF TOTAL	TYPES OF INJURY
FINGERS	58.5%		1		50.5%	CUTS — ALL TYPES
EYES	12.3%	70.8%	2	63.2%	12.7%	PUNCTURE WOUNDS: Foreign Body, 7.5% No Foreign Body, 5.2%
HANDS	11.7%	82.5%	3	75.7%	12.5%	EYE INJURIES
FOREARM	4.0%	86.5%	4	87.3%	11.6%	ABRASIONS
WRISTS	3.5%	90.0%	5	93.3%	6.0%	CONTUSIONS
FACE	2.0%	92.0%	6	95.0%	1.7%	BURNS — ALL TYPES
LEGS	1.6%	93.6%	7			
ARMS	1.2%	94.8%	8			
HEAD	.8%	95.6%	9			
4.4% REMAINING ARE DISTRIBUTED AMONG 22 ADDITIONAL BODY PARTS.					5.0% REMAINING ARE DISTRIBUTED AMONG 24 ADDITIONAL TYPES OF INJURY.	

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TABLE VIII.-A.

ONE YEAR — ANATOMICAL DISTRIBUTION OF INJURY — WORKING DAYS 306

	HEAD	EAR	FACE	NOSE	LIP	NECK	CHEST	ABDOMEN	BACK	FINGER	NAIL	HAND	WRIST	FOREARM	ELBOW	ARM	SHOULDER	PELVIS	HIP	THIGH	KNEE	LEG	ANKLE	FOOT	TOE	NAIL	TOTAL	SEVERE	RATIO INDEX
LACERATION	94	14	212	32	16	9	3	5	6	8162	2	1425	328	475	71	65	12		1	22	24	98	27	19	3		11125	14	1·97
ABRASION	25	6	64	9	2	5	10	7	24	1358		293	117	198	47	72	13		3	21	61	157	44	15	7		2558	1	8·6
CONTUSION	37		46	7	2	1	9	9	15	618	3	161	46	30	24	11	7	2	5	22	46	67	42	46	69		1325	2	16·6
PUNCTURE WOUND — NO FOREIGN BODY	1		8				1	2	1	828		194	15	40	3	8				8	4	8	3	19	3		1146		19·1
PUNCTURE WOUND — WITH FOREIGN BODY	1	1	1	1			1			1328		267	12	12		6				4	1	4		4	6		1649	1	13·3
BURN THERMAL			7			7	3	4		172		52	11	44	33	30	10			16	3	5		5			372	2	59·1
FRACTURE			1			1				10			2		2									4	6		26	26	846·
EVULSION	11									5	60																3	76	289·
INFECTION						1				110		16	3	4	1	1				1	1	3	2	1	2		146		150·
DISLOCATION																													
STRAIN						4	2	8	27	13		6	51	6	1	6	6	3	6	8	5	27	6	1			186		118·
MUSCLE FATIGUE							1	1	6	9		17	46	11		5	5			1		1	1				104		211·
SPRAIN									5	12		1	30				2						28	1			79		278·
IRRITATION — CHEMICAL	1						1	2	2	3		5	3	9		4							1				31		709·
IRRITATION — MECHANICAL				1						173		66		3	1	1								3			248		88·7
DERMATITIS	5		11			8	5	2	5	11		29	7	43	17	2	4			1	1	12	1	1			219		100·
TOTAL	175	21	349	50	21	35	37	40	91	12812	65	2532	671	875	158	281	59	2	12	102	149	360	176	124	97	57	22000		
	196		420							12877															97			57	
SEVERE	3		2			2				17		7	2	1	2	2						1		4	6		57		8
RATIO INDEX	112·		52·3	62·8	59·4	55·0	24·1			1·70		8·6	32·7	25·1	142·2	78·2	57·2	1100·0	633·3	252·	147·	61·1	125·	177·	226·				8·11

SEVERITY RATIO 1:386

EYE: FLOATING FOREIGN BODY $1878; IRRITATION 583; EMBEDDED FOREIGN BODY CORNEA 3$ 130; CORNEA LID EYE BALL; PUNCTURE WOUND; BURN 10 7; LACERATION 25 $ 12 24; ABRASION $ 17 11; CONTUSION 5 4; CHEMICAL IRRITATION 25; FLASH BURN 4; TOTAL 2710; CORNEA 169; CORNEA-1:16·0

EYE INJURY 8 2710 8·11

MEDICAL DEPT. BALTIMORE, MD.

Data typical of day-to-day activities in industrial Medical Departments, and covering these two types, are summarized in Tables VIII and IX.

Arranged from above downward in order of frequency (Table VIII), on the left are the individual body parts involved in injury; on the right, the types of injury. These data include only the *initial* care of an injury.

Body Parts

NINETY-FIVE and six-tenths per cent (95.6%) of all injuries involve only nine specific body parts.

The EYE ranks second in frequency. Add retreatments of eye injury and complaints referred to the eye, such as sty, blurred vision, conjunctivitis, etc., and it can be stated that approximately 18% OF ALL VISITS (OR ONE IN EACH SIX) WILL BE AN EYE CASE. This points up the importance of planning facilities to care for this specific sense organ. Because of the high frequency of eye cases, the positioning of this facility in proper relation to the other types of service is of equal importance.

On days when the wind is especially strong and gusty, be prepared for a high incidence of eye complaints.

Combining injuries of the upper extremity (above the fingers), and including face injuries with head injuries, will produce the following condensed summary:

Fingers	58.5%
Hands to Upper Humerus	20.4%
Eye	12.3%
Head	2.8%
Legs	1.6%
	95.6%

Types of Injury

SIX TYPES of injury account for 95% of the total. Note the closeness of the percentage of eye

TABLE IX.
COMPLAINTS

	Percent of Total	Progressive Total
1. Colds — all types	31.6%	31.6%
3. Indigestion	22.3%	53.9%
3. Headache	19.0%	72.9%
4. Sore throat	7.6%	80.5%
*5. Constipation	3.4%	83.9%
6. Toothache	3.4%	87.3%
7. Dermatitis	2.7%	90.0%
8. Ear ache	1.7%	91.7%
9. Myalgia	1.6%	93.3%
10. Nervousness	.7%	94.5%
Too vague to classify	2.0%	96.0%
	4.0%	Remaining

distributed among 35 additional complaints.

*Depending upon the proportionate number of female employees, menstrual complaints may be in any of the last six positions.

TABLE X.
TREATMENT FUNCTIONS. TIME SPENT IN DEPARTMENT

With Appointments

Time Group	Minutes	Average Minutes	Per Cent of All Cases	Progressive Total	
				Average Minutes Per Case	Percentage of All Cases
1	2:10	5.8	38.0%	5.8	38.0%
2	11:20	15.4	36.0%	10.5	74.0%
3	21:30	24.3	6.5%	11.6	80.5%
4	31:40	35.8	11.0%	14.6	91.5%
5	41:50	45.0	6.5%	16.7	98.0%
6	51:60	55.0	2.0%		
Total		17.53 Minutes	100.0%	17.53 Minutes	100.0%

injuries to that of body parts — (12.3% and 12.5%). Further discussion is not necessary.

The data in Table VIII give a fair idea of what to plan for in regard to care and treatment of injury.

For those interested in more detailed data we have included Table VIII-A as an example of the material from which the foregoing summary is derived. It is an analysis of 22,000 injuries.

Every complaint and symptom "in the book" is sometime encountered in industrial practice, however, in Table IX those which predominate are arranged from above downward in order of frequency. Ten account for 94% of all "sick visits." The first four account for 80.5%; the remaining six for 13.5%.

Colds — all types, include head and chest colds, with such leading complaints or symptoms as rhinitis, sinusitis, pharyngitis, cough, and bronchitis. Broadly, this classification may be termed upper respiratory. Approximately one out of each three sick calls will be for some kind of a "cold."

Time Spent in Department

HOW LONG do the types of cases, summarized in Tables VIII and IX, remain within the Medical Department? For a number of years, the time of entrance and of exit was stamped on the record of each visit, with an electric clock. Analysis of this long-term record gives a dependable answer to this question. Data covering a 20-month period are summarized in Table X.

The records from which Table X is comprised are divided into six 10-minute time periods, as noted in the first two columns. The average minutes per case spent in the hospital by those cases in each of the six time-groups is in the third column. The percent of all cases made up by each of the six groups is in the fourth column. In the two columns at the right, appear the progressive totals of average minutes and percentages.

This survey was made during a period when, with the exception of EMERGENCIES, all visits were PRE-SCHEDULED OR AN APPOINTMENT WAS MADE BY SUPERVISION. Such procedure was the accepted policy of management. Using a very liberal interpretation, it is safe to state that not more than 10% of all services classified as Treatment Functions could be called "emergencies." At least 80% of all cases in this survey were pre-scheduled or by appointment.

The progressive totals of the first three time-groups point to a significant fact. FOUR-FIFTHS, or 80.5%, OF ALL VISITS AVERAGED ONLY 11.6 MINUTES WITHIN THE HOSPITAL (38% averaged 5.8 minutes; 36% averaged 15.4 minutes; 6.5% averaged 24.3 minutes).

It can be inferred from this time-study that the majority of these cases are quite minor in character and individually require very little professional and "off-the-job" time.

Using identical methods, a time-study, made in this same factory during an 18-month period *prior* to the adoption and administration of the policy "to make appointments," is set forth in Table XI. The 26.93 average minutes per case in this study, when compared with the 17.53

TABLE XI.
TREATMENT FUNCTIONS. TIME SPENT IN DEPARTMENT

No Appointments. 18 Months 12,336 Visits

Time Group	Minutes	Average Minutes	Percentage of All Cases	Progressive Total	
				Average Minutes Per Case	Percentage of All Cases
1	2:10	7.8	34.2%	7.8	34.2%
2	11:20	18.7	33.4%	13.4	67.6%
3	21:30	27.2	14.2%	17.8	81.8%
4	31:40	37.2	9.1%	23.4	90.9%
5	41:50	48.2	6.7%	25.3	97.6%
6	51:60+	57.4	2.4%		
Total		26.93	100.0%	26.93	100.0%

minutes in Table X, represent a 34.9% saving of time; an average of 9.4 minutes per case. More detailed discussion of this comparison is deferred to Section III, where it will be referred to in relation to its importance in planning.

When the types of injury, body parts involved, and types of sick complaints presented in Tables VIII and IX, are considered in conjunction with the time-studies, some logical conclusions take shape:

1. The majority of "Treatment Function" cases encountered in in-plant industrial practice are very minor in character.

2. Six types of injury, nine specific body parts, and 10 sick complaints or symptoms predominate in 95% of all cases (Tables VIII and IX).

3. Not one in 82% of these cases will remain in the hospital more than 30 minutes. The average time spent per case by the number of cases in *each* of the first three time-groups that make up this 82% ranges from 5.8 to 27.2 minutes. The average time spent per case, by the total number of cases in this 82%, ranges from 11.6 to 17.8 minutes (Tables X and XI).

4. The last three time-groups account for the remaining 18%. The average time spent per case by the number of cases in *each* group ranges from 35.8 to 57.4 minutes. Only 2.4% of all cases exceed 50 minutes, and precious few spend more than one hour.

5. Not more than 2% will require transportation or some form of walking aid. Especially among those cases spending more than 20 minutes in the hospital, there are some with injuries or complaints sufficiently severe to be disabling in varying degrees. However, the great majority of all cases are ambulatory.

6. Approximately 1% will be temporarily totally disabled by injury or illness. These are the cases that require transportation to and treatment in those facilities planned to care for MAJOR EMERGENCIES.

Flow Chart of Medical Functions

THE quantitative analysis of the three chief functions set forth in Table I may be summarized as follows:

EXAMINATION.	
Functions 1-A, 1-B, and 1-C	8.8%
MINOR TREATMENT.	
Function 2-A	90.1%
MAJOR EMERGENCY.	
Function 2-B	1.1%
	100.0%

This represents an average day at full employment. All functions have now been discussed in some detail. Through experience and analysis, it has been found that, quantitatively, these functions follow a consistent flow-pattern to and from the various facilities provided within a Medical Department. In the following outline of this flow-pattern we will drop the above decimals and use 9%, 90%, and 1%.

Flow Pattern Through Medical Facilities

I. EXAMINATION FACILITIES: Nine percent (9%) of all medical contacts make use of these facilities. This 9% is composed of the following three groups:

6.0% — 1-A.	Pre-employment — Placement Examinations originate in the Employment Department.
1.5% — 1-B.	Periodic, Occupational, and Health Maintenance Examinations originate in the working area.
1.5% — 1-C.	Special Consultations originate in the working area, or within the Medical Department. A portion pass through the physician's private facilities.
9.0%	

II. MINOR TREATMENT FACILITIES: Ninety percent (90%) of all contacts make use of these facilities. This function (2-A) is composed of four groups. All originate in the working areas.

52%	Cared for in the minor treatment area, sometimes called "Main Dispensary." This area usually consists of one or a number of closely grouped treatment stations, booths, or small rooms.
18%	Eye treatment facilities. Room or space for the care of all occupational and nonoccupational eye injuries, conditions, or symptoms.
70%	

These first two groups, comprising 70% of all contacts, are the numerous short-term cases encountered in industry. They will be within the first two time-groups in Tables X and XI, averaging between 10.5 and 13.4 minutes per case, and never in excess of 20 minutes.

15%	Facilities for administering various physiotherapeutics. The majority are in the third and fourth time-groups, averaging between 24 and 37 minutes per case. An occasional case remains in the hospital (Medical Department) more than 40 minutes.
5%	Facilities for rest and recovery.
20%	Because of various circumstances, these cases will require facilities for rest and recovery.
90%	Most are in the fifth time-group, averaging between 45 and 48.2 minutes; some are in the sixth time-group (51 to 60 minutes), and an occasional case

may remain in the hospital more than one hour.

III. EMERGENCY FACILITIES: One percent (1%). Most of these major emergencies, due to injury or illness, will be in the sixth time-group (51 to 60 minutes). Some will remain more than one hour.

This facility flow pattern of the Treatment Functions will hold generally constant whether the Medical Department serves 100 or 10,000 employees.

Special Facilities

X-RAY: May be involved to some extent in all functions, but not in every contact. Its greatest proportionate use is in the EXAMINATION FUNCTIONS. In a small portion of MINOR TREATMENT cases dealing with trauma, X-RAY will be called upon to diagnose or rule out the presence of bone or joint injury, and foreign body. It will be used for the same purposes in perhaps one-half of the MAJOR EMERGENCIES due to trauma.

The X-Ray room belongs primarily within the Examination Function facilities, but should be accessible to the minor treatment area. Approaches to it should be designed to allow free passage of stretcher or wheel chair cases from all locations within the Medical Department.

LABORATORY: Laboratory work is associated predominantly with the examination functions. Unlike the X-Ray room, it is rarely, if ever, necessary for a patient to go into the laboratory. Specimens are usually obtained elsewhere. Especially in groups of medium size (500 to 3,000), *one person* may serve as both X-Ray and Laboratory Technician. For this reason it will prove an advantage to place the laboratory adjacent to the X-Ray room.

VISION TEST, AUDIOGRAPH, ELECTROCARDIOGRAPH, BASAL METABOLIC RATE, WEIGHT and HEIGHT: All are associated primarily with the examination functions, and the respective items of equipment should be housed in those facilities. The E.K.G. and B.M.R. are portable, which would meet the need for the occasional use of these instruments in other locations.

Medical Staff Involvement

RECORDS — SECRETARY — CLERK: Some form of recording is involved in *every* contact. The major portion is the function of, and should be done by, CLERICAL and SECRETARIAL personnel. That minor portion of recording requiring professional qualification will be written or dictated by physician, registered nurse, or technician

There are two chief classifications of records: ACTIVE and INACTIVE.

ACTIVE RECORDS: Records of all cases undergoing some form of treatment or examination are considered *active* until closed or discharged by a member of the medical staff. These should be kept in the location that is *most accessible to the center of treatment activity*. Needless to say, active records should be consistently subjected to routine review, in order to keep their number and bulk at a minimum.

INACTIVE RECORDS: Also referred to as PERMANENT records. The accumulation of completed and closed active records, and all other records pertaining to any individual's contacts with the Medical Department.

In industrial practice reference to the accumulated records of individuals is necessary many times each day, for various reasons. Data essential to valuable research and analysis are contained in these files. For these reasons permanent record files should be in a location *adjacent to the center of* CLERICAL *or* SECRETARIAL *activity*. Too often one finds these records stowed in an isolated corner of the Medical Department, remote from all activity.

PHYSICIAN: In the Examination and Major-Emergency Functions the physician is directly involved in *every contact*. The physician's time spent per case averages highest during his services to these contacts. Major emergency cases are relatively rare.

He will *not* be directly involved in *more* than 10% of the Minor Treatment Function contacts. These involve far less physician's time per case, but in their aggregate they form the greatest number of individuals he will be called on to attend, during an ordinary daily tour of duty. (An *ordinary* day is one that does not experience an extraordinary high rate of pre-employment examinations.)

Taking the above points into consideration, placing the physician's private office and facilities as near as possible to the Examination Facilities and to the center of Minor Treatment activities will prove, from a functional viewpoint, to be the best location.

X-RAY AND LABORATORY TECHNICIANS: The physician is involved in every contact that uses these services. As previously pointed out, the X-Ray, and especially the laboratory, are associated predominently with the Examination Functions. The area in which these technicians work should be located close to the physician's office, and should be readily accessible to the center of nursing activity.

REGISTERED NURSE: In addition to responsibilities of supply, maintenance, and sanitation of the medical quarters, the REGISTERED NURSE IS INVOLVED IN EVERY CONTACT. This status, unique to the nurse, makes her the pivotal point, the hub, around which the wheel of all medical functions and services revolves. Since it is involved in all functions and every contact, the nursing service is the focal point on which all time and motion studies should converge. Whether planning a large or the smallest department, keep the

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unique status of the nursing service uppermost in mind.

This completes the functional and work analysis of industrial medical services. Material such as this, by its very nature, makes for anything but entertaining reading. Basic fundamentals pertaining to various conditions and problems, when properly adapted and applied, are of great value. We have attempted to "put on paper" the much needed fundamentals that are vital to the efficient layout planning of industrial Medical Departments. Reference, throughout the succeeding text, to every item so far enumerated, will demonstrate the adaptation and application of these fundamentals to our purposes. It will become evident that the skill and foresight of those creating a plan or editing one already formulated will be proportionate to their knowledge of, and ability to apply, these fundamental principles.

An opinion of the layout-efficiency of a Medical Department, based only on impressions gained through one or even a number of *visits* is of little or no value. To the eye, a most inefficient layout may appear consistently bright, beautiful, modern, immaculate. After visiting one of these eye-pleasing departments, spend some time with a nurse who has been on duty there for a year or more. Ask her how she knows "the layout is so inefficient." The answer "my feet have told me so," is typical. (There should be some slogan to apply to "nurses' feet." An industrial nurse spends as much time on her feet as a stenographer spends on her "spread.")

Place a blueprint of the department layout before this experienced nurse. The chances are 50 to one, that she will point out specific reasons why "my feet get so tired." She will go further, sketching how facilities might have been arranged; indicating graphically that "if this facility were placed here, and that one there, my daily walkathon would be cut by half." Such a method of appraisal will yield a more dependable impression of the efficiency of a layout, than a dozen visits. Appearances alone can be so deceiving!

Before beginning construction of a NEW Medical Department it would be wise to subject the plans to review in the light of the fundamentals set forth in this section. Preview of this character will go far toward insuring optimum efficiency. Managements make it common practice to subject their plans for a new factory to similar reviews before construction. Managements often go further; analyzing actual production eventualities as they are portrayed through the animated operation of scale models of factory and contents. Both of these practices open avenues of improved efficiency, and forsee costly errors that can be avoided. Both practices have proved sound investments, in the judgment of managements. Applying such practices during the planning stages of industrial Medical Departments will likewise prove to be sound investments.

Since one can not very well demonstrate "the animated operation of scale models" with the written word alone, this presentation will be confined to what can be placed on paper by way of script and graph. In the next section the layout plan of a Medical Department, designed to serve specified purposes, will be reviewed on the basis of the content of this section.

This section closes with two important conclusions (graphically represented in Fig. 1):

1. Efficiently to serve all functions of an industrial Medical Department, three separate groups of facilities are necessary.

2. Since all functions must operate simultaneously and nursing service is involved in all functions and every contact, planning should concentrate on economy in distances, time, and motion expended by the nurse in her to-and-fro services among all facilities.

The color assigned to a Functional Facility group in Fig. 1 will be confined to, and always identify, that same group in all subsequent illustrations. Each color will identify the floor area occupied by the respective group of Functional Facilities, and the pathways or routes traveled by employees to and from the area:

YELLOW—represents the Examination Functions;
GREEN —the Minor Treatment Functions; and
RED —the Major Emergency Functions.

(28536 Wildwood Trail, Wildwood, Michigan.)

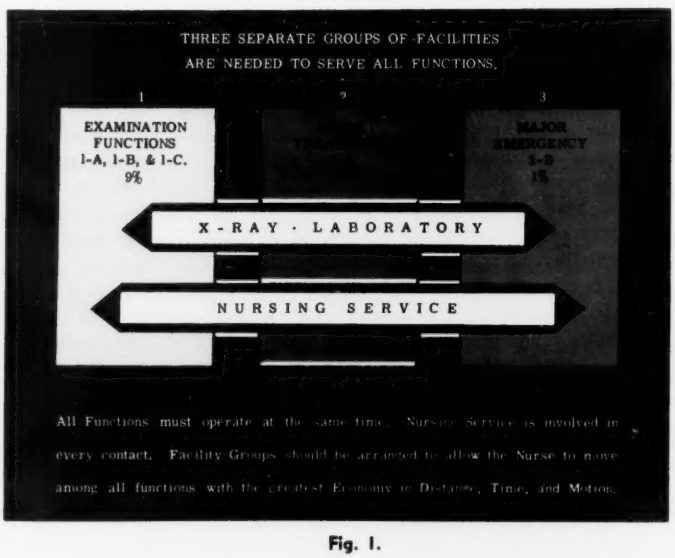

Fig. 1.

Pre-Employment X-Ray Survey of the Lumbosacral Spine in Bus Drivers

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A LARGE number of bus drivers, members of the Autobus-Cooperative, became unfit for work at an early age because of lesions of the lumbosacral spine. Consequently, a routine x-ray examination of the lumbosacral spine has been included in the pre-employment checkup of all applicants for membership since March, 1952.

In all, 1030 examinations of driver-applicants have been performed to date. Based on our experiences, a standard has been worked out for acceptability of candidates.

Similar pre-employment surveys have been in use in other countries on a large scale. Thus Colcher and Hursh[1] (1950) report some 1500 examinations of train-engine personnel of the Pennsylvania Railroad; and Runge[2] (1954), some 4654 examinations at American Locomotive, Schenectady, New York.

In Israel our survey is the first of its kind. We have found, as in other countries, that many became unfit for work for a prolonged period or permanently disabled because of lumbosacral disturbances. The reason for our high rate of disablement may lie in the fact that in this country many people had to switch over to unaccustomed occupations involving heavy physical strain, as well as in the recognized high percentage of lumbosacral abnormalities that may precipitate disc lesions. Among our cases 35% showed some such anomaly. Our total of abnormalities of the spine (congenital or acquired) was 59.31% (Table I). The percentage for other countries recorded in the literature is 45%.

The purpose of our routine x-ray examination is to identify the applicant whose spinal x-ray films reveal changes (congenital abnormalities, degenerative or traumatic lesions, or spinal diseases) that make him unsuitable for the proposed employment. If rejected, the candidate can be advised regarding a more suitable occupation. For the newly-accepted the x-ray films are attached to his file, and become part of his permanent record, as well as important evidence in the event of subsequent injury or disease, and in the assessment of a disability.

THE EXAMINATION: All the applicants were young men; the average age was 25 years. Those who successfully passed a general examination (heart — clinical and E.C.G., lungs, eyes, ears, etc.) were submitted to the spinal examination. An orthopedic surgeon performed a thorough clinical examination. A radiologist then reported on routine A-P and lateral x-ray pictures of the lumbosacral spine. When necessary, oblique pictures were taken, or special investigations (such as tomography) were instituted. In cases of clinical findings of the upper spine, A-P and lateral films of the dorsal spine also were included.

LUMBOSACRAL ABNORMALITIES WHICH FORM THE BASIS OF NONEMPLOYMENT AS BUS DRIVER:

1. CONGENITAL ANOMALIES:

(a) *Spina bifida* (with considerable arch defect) except S1.

(b) *Hemi- or incomplete sacralization of L5.*

(c) *Deformities of L5* (brachyspondyly etc.).

It has been known for some time that the above-mentioned congenital abnormalities constitute predisposing factors for the development of degenerative or traumatic lesions. These latter lesions are usually associated with a congenital hypoplasia of the lumbosacral intervertebral disc. Gray[3] (1947) demonstrated that in consequence of the disc hypoplasia the maximal pressure which normally falls on the lumbosacral disc is borne by the 4th lumbar disc in view of the fixation of the 5th lumbar vertebra. The 4th disc is therefore particularly liable to damage. Munk[4] (1952) showed that the same principle applied also to other abnormalities of the 5th lumbar vertebra (spina bifida, brachy-

TABLE I.
CASES, ACCEPTED AND NOT ACCEPTED

	Number	Percentage
Number of cases reviewed:	1030	100%
Average age:	25	
Number of cases of normal findings:	419	40.69%
Number of cases of pathological findings:	611	59.31%
Accepted:	369	35.81%
Not accepted:	242	23.50%

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spondyly, etc.). He pointed out that in those cases in which the lumbosacral and the 4th lumbar discs were involved at the same time the anomaly was that of the 5th lumbar vertebra with congenital hypoplasia of the lumbosacral disc, while a 4th disc lesion was generally due to acquired causes. These findings have found support in numerous examples in the literature, and in clinical experience. Therefore it seems justified for our purposes to pay special attention to all the above-listed abnormalities which constitute factors of instability of the lumbosacral spine. We regard these findings as sufficient cause for the nonemployment of a driver-applicant. On the other hand, contrary to the system of assessment in the U.S.A., we accept cases of complete sacralization of the 5th lumbar vertebra, i.e., spina bifida of S1, as suitable for acceptance. In our candidates we found 47 cases of complete sacralization (4.56%), and 205 cases of spina bifida S1 (19.90%). All these were accepted.

The following were not accepted: 10 cases of spinal arch defect (spina bifida) of L5 (0.97%), and 79 cases of hemi- or incomplete sacralization or other deformities of L5 with hypoplasia of the lumbosacral disc (7.66%).

(d) *Spondylolysis and spondylolisthesis.*

Spondylolysis which is characterized by a gap in the interarticular portion of the vertebral arch, as well as spondylolisthesis where in addition anterior displacement of the affected vertebra takes place, are both factors of a high-grade instability of the lumbosacral vertebra column. Spondylolysis is potentially dangerous, as the vertebra may at any time slide forward. These abnormalities are most common at the 5th lumbar vertebra but may also occur at L4. They may be predisposing factors for the development of traumatic lesions or of generalized degenerative changes of the lumbosacral spine (spondylosis deformans, osteoarthrosis). Their discovery leads to nonemployment of the candidate as a bus driver. We found spondylolysis in eight cases (0.77%), and spondylolisthesis in eight cases (0.77%).

2. Scoliosis:

If the scoliosis is of the true type (with rotation of vertebrae) and not conditioned by faulty posture, the candidate is rejected. There too we are confronted with factors of instability of the lumbosacral spine which is likely to lead to generalized degenerative changes in the vertebral column (spondylosis deformans, osteoarthrosis). In our series 53 cases (5.14%) were discovered and rejected from bus-driver service.

3. Degenerative and Traumatic Disc Lesions:

(a) *Spondylosis deformans* (osteoarthrosis of the spine) as a manifestation of generalized degenerative changes of the intervertebral disc must be regarded as a serious disability, particularly at the young age of our candidates. For this reason we do not accept applicants into the Cooperative if any of the manifestations of this process are discovered, i.e., osteophytes, sclerosis of the vertebral margins, narrowing of the disc spaces, osteoarthrosis of the small joints, etc. Twenty-five cases (2.42%) were found in our applicants, and refused acceptance.

Table II.
Rejected Cases in Relation to Type of Lesion

	Number	Percentage
1. Anomalies:		
(a) Spondylolysis:	8	0.77%
(b) Spondylolisthesis:	8	0.77%
(c) Spinal arch defect (spina bifida) apart from S1:	10	0.97%
(d) Hemi- or incomplete sacralization:	55	5.33%
(e) Deformities of vertebrae or marked alterations of physiological curvatures of the spine:	24	2.33%
2. Scoliosis with rotation of vertebrae:	53	5.14%
3. Signs of generalized degenerative lesions (spondylosis deformans, spondylarthrosis deformans):		
(a) Narrowing or asymmetry of the intervertebral disc spaces (except hypoplastic lumbosacral disc):	25	2.42%
(b) Osteophytes:		
(c) Osteoarthrosis of the small joints, etc.:		
4. Disc lesions:		
(a) Osteochondrosis deformans juvenilis dorsi (Scheuermann's disease, and its sequelae):	—	—
(b) Schmorl's hernia (nuclear intrusion into the vertebral body):	25	2.42%
(c) Traumatic disc lesions: Narrowing of intervertebral space, secondary signs of disc degeneration, e.g., sclerosis of marginal crests, osteophytes as at two adjacent vertebrae, etc.:	19	1.84%
5. Other vertebral lesions:		
(a) Traumatic (fractures, dislocations, etc.):	14	1.35%
(b) Inflammatory and/or destructive lesions:	—	—
(c) Neoplasms (primary or secondary):	1	—

(b) *Traumatic disc lesions:*

1. Osteochondrosis deformans juvenilis dorsi (Scheuermann's disease): At the age of our candidates we are naturally only confronted with the consequences of this disorder, i.e., kyphosis of the lower thoracic spine, wedge-shaped narrowing of the vertebral bodies, and narrowing of disc spaces. There is also usually evidence of secondary spondylosis deformans in the form of marginal osteophytes of the vertebrae. It should be pointed out that many authors (e.g., Schmorl,[5] 1932; Schinz,[6] 1953; Bradford-Spurling,[7] 1941) believe that the primary lesion in this disease is the traumatic eruption of the nucleus pulposus into the spongiosa of the vertebral body at an early age which secondarily leads to similar disc changes as after other traumata with disturbances in the disc physiology, namely, an uneven distribution of pressure on the vertebral disc borders. The maximal pressure is exerted on

TABLE III.
ACCEPTED CASES IN RELATION TO THE TYPE OF LESION

	Number	Percentage
1. Complete sacralization:	47	4.56%
2. Spina bifida of the 1st sacral vertebra:	205	19.90%

the anterior parts of the vertebral disc borders because the small joints prevent a collapse of the posterior parts of the disc. The maximal pressure is therefore noticeable at the epiphyseal ring, so that growth is inhibited, and finally a wedge-shaped deformity of the vertebral body ensues. We found in our series no cases with late changes of osteochondrosis juvenilis of the spine (Scheuermann's disease).

2. Schmorl's hernia at 20 to 30 years: At the age of our cases we must attach the same significance to the eruption of the nucleus pulposus into the spongiosa of the vertebral body as to an anterior or posterior herniation of the disc. Both lead to the same pathological changes (traumatic degeneration of the disc) and to the same clinical manifestations. As in osteochondrosis juvenilis of the spine (Scheuermann's disease) there may be a sudden explosion-like rupture of the annulus fibrosus with propulsion of nucleus material into the vertebral body. Here also develop secondary changes of the adjoining vertebrae in addition to the narrowing of the disc space due to disc degeneration. Formation of osteophytes and sclerosis of the edges of the adjoining vertebrae ensue also in this condition. Cases of Schmorl's herniation were refused acceptance. In our series we discovered 25 cases (2.42%).

4. TRAUMATIC DISC LESIONS (anterior and posterior herniation of the disc):

Relatively acute cases of disc lesions which are manifested only by narrowing of a disc space are naturally uncommon at a pre-employment survey. On the other hand, one would expect to discover secondary manifestations at the vertebral edges adjoining the affected disc. The changes are the same as in spondylosis deformans (osteoarthrosis) though confined to a pair of neighboring vertebrae only: narrowing of the disc spaces, anterior or also posterior osteophytes, sclerosis of the vertebral edges, and discogenetic arthrosis deformans of the small vertebral joints (Oppenheim,[8] 1944; Munk,[4] 1952, etc.). These 19 cases (1.84%) of our series were rejected.

5. OTHER TRAUMATIC LUMBOSACRAL LESIONS:

Old vertebral fractures or subluxations may be expected to turn up in small numbers in a survey department. The fractures usually appear as wedge-shaped deformities of vertebrae (compression fractures) frequently with indentation of the vertebral edges and with signs of traumatic disc damage of the adjoining discs. Occasionally avulsion fractures are discovered of the upper anterior vertebral margin due to the pull at the attachment of the anterior spinal ligament when this is put under undue tension during the anterior protrusion of the disc. It is interesting that many of these patients had no knowledge or recollection of any spinal injury.

Real dislocations should hardly be discovered in a survey department. On the other hand there may be cases of vertebral displacement in connection with severe traumatic or degenerative disc lesions. All these cases are of course unsuitable for acceptance as drivers of the Co-operative. We discovered 14 old vertebral fractures (1.35%).

6. DISEASES OF VERTEBRAE:

In a survey of this kind it is unlikely that inflammatory destructive diseases of the spine should be discovered. Generally these diseases are accompanied by obvious symptoms and signs. In this series no such cases occurred.

Tumors of vertebrae may rarely be brought to light by routine examinations. We thus found one case of osteoclastoma of the 4th lumbar vertebra which had given rise to no complaint and no clinical sign.

Summary

THE reasons and the purpose of the pre-employment x-rays examinations of the lumbosacral spine in bus drivers are given.

The technique of the examinations is mentioned.

The standard system of assessment is described and analyzed in relation to the different abnormalities of the spine (anomalies, scoliosis, generalized degenerative disc lesions, traumatic disc lesions, other vertebral lesions).

The results of the examinations in 1030 candidates are described and tabulated in relation to the system of assessment.

[The author wishes to express his greatest appreciation to Dr. J. Munk, Director of the Radiological Department, Government Hospital "Rambam," Haifa, for assistance in the preparation of this work.]

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Electrocardiographic Survey

OF HOTEL EMPLOYEES IN NEW YORK CITY

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THE NEW YORK Hotel Trades Council and Hotel Association of New York City Health Center, Inc., began to provide diagnostic and therapeutic care in October, 1950, for 35,000 union hotel workers, employed in 188 New York City hotels and 55 concessions. The hotel workers, representing over 200 occupations, ranged in age from 18 to 85 (median age 47); 62% were males. The principal employments representing approximately 70% of the employees were: maids, waiters, waitresses, elevator operators, housemen, cooks, dishwashers, telephone operators, bellmen, bartenders, and bus boys.

The survey was conducted at the Health Center over a 12-month period commencing March 1, 1955, with the express desire of obtaining the incidence of abnormal cardiograms encountered in routine physical and periodic examinations performed on the personnel of this industry, at and beyond the age of 45. This age, while admittedly arbitrary, was chosen because we were particularly interested in detecting degenerative cardiac disease, which commonly enough defies recognition upon routine physical examination or by radiographic means. Below the age of 45, the bulk of cardiac disease is not so evasive, owing to the presence of valvular incompetence with the respective auscultatory findings and the telltale radiologic silhouette.

The total number of electrocardiograms performed was 3340, of which 2201 were on males (65.9%) and 1139 on females (34.1%). The 12-lead cardiogram was employed routinely, which included the three limb leads, three augmented limb leads, and six precordials. Only generally accepted clinical patterns were recorded, and minor deviations as slurring or low voltage of QRS, ectopic beats, sinus bradycardia or tachycardia were disregarded.

The number of abnormal cardiograms obtained was 405 (12.2%). Males contributed 258 (63.7%); females 147 (36.3%). *(All known cases of cardiac disease were excluded from this series.)*

Dawber and associates, in a mass survey of 2000 adults, state that "lead 1 will detect essentially the same proportion of persons with clinically definite or possible cardiac abnormali-

TABLE I.
DISTRIBUTION OF ABNORMALITIES BY SEX AND AGE GROUPS

Age Group	Sex and No. in Age Group			No. of Abnormalities by Sex			Percent
	M	F	T	M	F	T	
45-54	981	556	1537	83	51	134	8.7%
55-64	874	457	1331	114	70	184	13.8%
65-74	323	119	442	57	22	79	17.9%
75 and over	23	7	30	4	4	8	26.6%
Total	2201	1139	3340	258	147	405	

TABLE II.
TYPES OF MYOCARDIAL INFARCTIONS OF PATIENTS BY SEX AND AGE GROUPS

Age Group	Anterior			Antero-septal			Antero-lateral			Posterior			Total
	M	F	T	M	F	T	M	F	T	M	F	T	
45-54	2	0	2	3	1	4	2	0	2	2	2	4	12
55-64	6	0	6	1	1	2	3	2	5	12	2	14	27
65-74	3	1	4	3	0	3	0	1	1	7	0	7	15
75 and over	0	0	0	0	0	0	0	0	0	0	0	0	0
												Grand	
Total	11	1	12	7	2	9	5	3	8	21	4	25	Total 54

TABLE III.
TYPES OF CORONARY ARTERY INVOLVEMENT BY SEX AND AGE GROUPS

Age Group	Myocardial Anoxia (Coronary Insuff.)			Subendocardial Infarction			Subendocardial Infarction with L.V. Hypertrophy			Total
	M	F	T	M	F	T	M	F	T	
45-54	23	11	34	8	12	20	3	0	3	57
55-64	27	18	45	6	9	15	5	2	7	67
65-74	9	4	13	4	3	7	0	0	0	20
75 and over	0	0	0	0	1	1	1	0	1	2
									Grand	
Total	59	33	92	18	25	43	9	2	11	Total 146

TABLE IV.
LEFT VENTRICULAR HYPERTROPHY WITH OR WITHOUT STRAIN BY SEX AND AGE GROUPS

Age Groups	Left Ventricular Hypertrophy without Strain			Left Ventricular Hypertrophy with Strain			Total
	M	F	T	M	F	T	
45-54	14	6	20	8	12	20	40
55-64	9	6	15	20	14	34	49
65-74	13	2	15	6	7	13	28
75 and over	1	0	1	1	0	1	2
						Grand	
Total	37	14	51	35	33	68	Total 119

TABLE V.
DISTURBANCES IN CONDUCTION AND/OR RHYTHM BY SEX AND AGE GROUPS

Age Group	Left Bundle Branch Block			Right Bundle Branch Block			Auricular Fibrillation			Auricular Flutter			Nodal Rhythm			Heart Block 1st Degree			Heart Block Complete			Total
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
45-54	3	2	5	10	2	12	2	0	2	1	1	2	0	0	0	2	2	4	0	0	0	25
55-64	6	5	11	9	1	10	2	2	4	1	0	1	0	1	1	7	6	13	0	1	1	41
65-74	3	0	3	4	2	6	4	1	5	1	0	1	0	0	0	1	0	1	0	0	0	16
75 and over	0	0	0	1	1	2	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	4
Total	12	7	19	24	6	30	8	4	12	3	1	4	0	1	1	10	9	19	0	1	1	86

TABLE VI.
RESUME OF THE ABNORMAL FINDINGS

Table	Type of Abnormality	No.	% of the Abnormalities	Over-all Percentage
II.	Myocardial infarction	54	13.3	1.6
III.	Coronary artery involvement	146	36.1	4.4
IV.	Left ventricular hypertrophy with or without strain	119	29.4	3.6
V.	Disturbances in conduction and/or rhythm	86	21.2	2.6
	Total	405	100.0	12.2

ties as the 12-lead cardiogram."[1] At variance with this finding, Weintraub reports that "in 200 definitely abnormal 12-lead electrocardiograms, 52 (or 26%) presented a normal lead 1."[2] Experience has convinced us that the 12-lead electrocardiogram is essential for the proper clinical interpretation of coronary or degenerative myocardial disease. The leads combine, as it were, to form a mosaic.

We are mindful, too, of the number with silent coronary disease who presented no deviations from the normal in this series, and are tabulated with the normal group. Franco states "the shortcomings of the electrocardiogram need no comment here, but experience has proved it to be a valuable part of the periodic examination."[3] Master and associates found "at least 40% of patients with coronary disease do not present any objective evidence of heart disease."[4] Think of the embarrassment of that physician who assigns these to the cardiac neuroses. Riseman and Josephs state "in 100 cases of angina without infarction, the 12-lead cardiogram was found to be normal in 52%."[5]

Table I shows that EKG abnormalities increased approximately 50% with each succeeding decade, beginning at age 45.

Table II shows that there were 44 (2.0%) infarctions in the males and 10 (0.8%) in the females; thus the frequency of occurrence is two and a half times greater in the male. Twenty-seven (50%) of the infarctions occurred in the 55 to 64 age group which comprised approximately 40% of the total number of examinations.

Table III includes three groups of patients in whom EKG abnormalities are frequently found where symptoms may not be marked. As is the case in the preceding group with actual infarction, the incidence is highest in the 55 to 64 age group. This reflects both the increased incidence of coronary disease in this age group and the large number of individuals in this age group in the industry. It is in these groups of abnormalities that the interpretation of electrocardiographic abnormalities is open to differences of opinion as to which changes are abnormal and which can be considered within normal limits.

Comment

MANY surveys of this type have been conducted with no attempt to exclude symptomatic heart disease and in groups such as ours where patients with overt cardiac disease were excluded wherever possible.

The over-all incidence of 12.2% abnormal cardiograms found in this study is in general agreement with other studies of this type, which "show an incidence varying from 5.2% to 18.2% in large series comprising over 2000 cases."[6]

The variation in incidence of abnormal EKG's in this and other studies noted above is in part due to the criteria used to determine cardiographic abnormalities. This becomes numerically significant in the groups represented in Tables III and IV above and was commented on earlier.

Two points seem worthy of emphasis: First, that such routine mass surveys should not be used to replace a careful clinical history, for it is well recognized that coronary heart disease can exist without objective evidence of heart disease. On the other hand, it is evident from studies such as this that the EKG has a definite place in detecting a large group of individuals with clinically silent heart disease.

Conclusion

THE ELECTROCARDIOGRAM cannot be employed to determine the presence of impaired cardiac function and, in that sense, detect cardiac disease. It follows, therefore, that an abnormal graph is not synonymous with heart disease. However, it is an important ancillary procedure in periodic health appraisal when considered in conjunction with clinical history and the physical findings.

The intent of this survey was not that of mass screening for heart disease, but rather to obtain the incidence of abnormal cardiographic patterns encountered in routine physical examinations above the age of 45. Should the incidence of

abnormals have been insignificant, the procedure would be economically impractical. But, with known cardiacs excluded from the series, a 12.2% occurrence is impressive.

We believe continued surveillance is the best approach to this silent segment of cardiacs. The plan is to repeat the electrocardiogram annually with the periodic examination and when necessary with whatever frequency the problem demands.

Thus, with a serial study, the "base-line" graph will serve as a valuable record for comparison. In this manner, cardiac disease may be uncovered at an early and possibly remedial stage — when preventive measures for maintaining health can be instituted and so prolong the period of productivity in this industry.

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Wellness and Leadership

EVERY person who is in command of an organization, whether it be a small group or a nation, has a leverage position of power over the lives of others, Therefore, it would seem to be common sense that persons in leadership positions be at a high level of wellness when they exercise the responsibilities of their authority. It is not out of the realm of possibility that ultimately we will consider it desirable, as research opens up means by which we can test and enhance the levels of wellness, that our national leaders of industry and government will be required to undergo tests of wellness, and therapy if needed, just as many of them now undergo medical and health tests in order to be sure that they are protected from sickness. If such a safeguard for society in general were in force, would it not be our best insurance against a Hitler taking over? If such tests to ascertain personal levels of wellness became recognized as a routine health measure, would it not be likely that the public generally would require this as a safeguard from those whom it entrusts with leadership?

—From "Points of Attack for Raising the Levels of Wellness," by HALBERT L. DUNN, M.D., in *J. Natl. Med. Assn.*, July, 1957.

Trends

IN MANY AREAS of the country, individual physicians have established central industrial clinics to provide industrial medical health and nursing services to surrounding small industries. Such clinics may be found in many cities, including Newark, New Jersey; Cleveland, Ohio; Buffalo, New York; Seattle, Washington; Portland, Oregon, and Milwaukee, Wisconsin. Some of these clinics are broadening their services and are scheduling regular visits by the physician and nurse to each of the participating establishments for plant inspections, consultation, and services. This growing practice of bringing the medical service to the work place by industrial clinics is based on two acknowledged needs: (1) that the industrial physician and nurse know the working conditions and the physical and emotional demands of the various jobs in the establishments which they service, and (2) that the industrial physician and nurse be regularly available in the plant for services and for health counseling and guidance. The industrial medical clinic at Portland, Oregon, illustrates the type of services offered by such facilities. Its services include pre-employment and periodic physical examinations, immunizations, survey of work places for elimination of toxic and sanitation hazards, treatment of occupational injuries and diseases, with emphasis on early rehabilitation, and cooperation with the local health department and voluntary agencies in case finding, in controlling infectious and chronic diseases, and in worker health maintenance.

—From "Current Trends in Occupational Health" by SEWARD E. MILLER, M.D., *J. Michigan State Med. Soc.*, August, 1957.

Occupational Hearing Loss

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HEARING, in its proper significance, is an all-important function, serving the social, interpersonal and communicative life of the human being. It not only plays a vital role in the social adjustment of each person in his day-to-day relations with his fellow men, but it also determines to a large extent his earning powers and his ability to obtain employment. It follows that loss of hearing handicaps the individual in these areas of human relations, and that every effort should be directed toward conserving this important sensory function.

The evaluation of hearing and hearing loss is primarily of direct interest and concern to the otologist. There are, however, certain facts relevant to this subject of which the family physician should be aware. He is the one who is usually consulted by his patients regarding hearing losses which arise from various causes. Generally speaking, the physician is familiar with reduced hearing acuity resulting from such causes as excessive wax, perforated ear drums, chronic draining ears, etc. Many practitioners, however, are either totally uninformed or completely misinformed regarding the hearing impairments that are of occupational origin. The family doctor should be sufficiently aware of and informed in the area of occupational hearing loss so that he can, with competence and medical assurance, advise and refer those patients he suspects are suffering from impaired hearing of industrial origin. It is the purpose here to present basic information and guidance which will enable the family physician better to render such service to his patients. First a brief review of the anatomy and function of the human ear. The ear is divided into three distinct parts: (1) the external or outer ear, (2) the middle ear, (3) the inner ear. They function as follows: Sound waves are conducted through the external ear as acoustic energy and changed into mechanical energy by the ear drum and ossicles of the middle ear. This energy in turn changes into a fluid movement within the inner ear which excites the hair cells of the cochlea. Electrical impulses are set up in the cochlea which are conveyed via the auditory nerve to the brain where they are interpreted as sound.

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Any physical defect or condition of the outer or middle ear which interferes with the passage of sound results in what is referred to as a conductive hearing impairment. Injury, disease, or damage to the inner ear can result in a neurosensory type of hearing impairment. A combination of both inner ear and conductive hearing impairments is often seen clinically and is referred to as a mixed type hearing loss.

THE TERM "occupational hearing loss" is used to denote impairment of hearing which arises in, during the course of, or as the result of, one's employment. The hearing loss may be partial or complete, and it may affect one or both ears. Occupational hearing loss can be classified under the following causes: (1) mechanical trauma, (2) acoustic trauma, (3) noise-exposure.

Mechanical trauma can result from blows to the head as well as local trauma to the region of the ear. It may also follow the introduction of foreign objects, or burns of the ear canal which result from sparks and molten metal.

Acoustic trauma refers to the immediate loss of hearing produced by one or a few exposures to sudden, intense forms of acoustic energy such as explosions or blasts.

The third cause of occupational hearing loss is noise-exposure. This refers to the accumulative loss of hearing which is always nerve type, and which develops over a period of months or years of employment in hazardous noise levels.

Generally speaking, it is not difficult to understand how sudden loss of hearing can result from explosions, blasts, and local trauma to the head or ears. The listener may not, however, understand how a vague, intangible sensation such as noise can cause loss of hearing. A brief comment on the nature of sound and the response of the human ear to it should help clarify this point.

Sound may be defined as a wave motion set up by a vibrating body. The waves move through air at approximately 1120 feet per second and produce the sensation of hearing if their intensity and frequency fall within certain limits. Noise is a mixture of various sounds, and is usually considered as unpleasant and undesirable.

Sound and noise have two important dimensions: (1) frequency and (2) intensity. The frequency of a sound determines its pitch and

is measured in cycles per second. The young adult with normal hearing is capable of hearing sounds ranging from as low as 20 cycles per second up to approximately 16,000 cycles per second. When sounds become higher than this they are no longer audible to the human ear and are referred to as ultrasonic sounds.

Perhaps the most vital portion of the total frequency range of the human ear is that group of frequencies which encompasses the speech zone range. The most important frequencies comprising this range are between 500 and 2,000 cycles per second. Hearing loss occurring in these frequencies is particularly disabling because it handicaps the person in his communication with his family, friends, and co-workers.

Up to this point we have considered the dimension of sound referred to as frequency which is measured in cycles per second. The other important dimension of sound is intensity or sound-pressure level, which is measured in decibels. When we speak of the sound-pressure level of a noisy area we refer to the intensity level of the noise as measured in decibels. The decibel is a dimensionless unit which expresses the ratio of the intensity of one sound to that of another.

The measurement of sound which includes its frequency characteristics as well as its intensity can be made by a combination of sound-level meters, octave-band analyzers, oscilloscopes, and other electronic apparatus.

An accurate measurement of a person's hearing acuity can be made by means of a properly calibrated, pure-tone audiometer. The audiometer is an electronic instrument capable of producing pure tones at controlled frequencies and intensity levels. These sounds are presented through ear phones to a person whose hearing is to be tested. The audiometric technician can vary the frequency and intensity level of the sounds and thereby gain an accurate measurement of the person's ability to hear. The result of such a test is recorded on a chart referred to as an audiogram which graphically or numerically portrays the hearing acuity as a threshold curve.

WHEN workers with normal hearing are exposed to hazardous noise levels for a sufficiently long time a temporary depression of hearing takes place which is referred to as "temporary threshold shift." Recovery from this temporary hearing loss usually takes place minutes or hours after the worker has been removed from the noisy environment. Following continued and repeated exposure a stage is reached where the hearing loss is more severe and recovery is incomplete. The residual hearing loss, or that portion of hearing which never returns, is referred to as noise-induced hearing loss. As defined previously, this is the accumulative loss of hearing which is always nerve type and which develops over a period of months or years of employment in hazardous noise levels.

There are a number of factors that determine to a large extent the degree of hearing impairment in cases of noise-induced hearing loss. The five most important of these are:

1. How loud the noise is (sound-pressure or intensity level).
2. What type of noise it is (frequency characteristics).
3. How long the period of exposure is (hours per day and length of total employment).
4. How susceptible the worker is (has he "tin ears" or "tough ears").
5. What the time-distribution of the noise is (steady or interrupted noise).

The worker's pure-tone audiogram in the early stages of occupational hearing loss due to noise-exposure is characterized by a sharply localized dip of the threshold curve in the area of 4000 cycles per second. At this stage he is not aware of his loss, and his only complaint may be due to ringing ears (tinnitus). As degeneration continues the loss spreads to the higher frequencies, and gradual involvement of the speech zone range occurs. The development of this type of hearing impairment is slow and insidious, and oftentimes the worker is completely unaware of its existence until he has difficulty in conversation.

The energy present in intense noise levels commonly found in many modern industrial plants can cause disruption and degeneration of the delicate sensory cells in the inner ear, with secondary degeneration of the ganglion cells. This damage to the inner ear is permanent and does not respond to any known treatment. All efforts to combat this type of hearing impairment must, therefore, emphasize preventive rather than curative measures.

Medical-Legal Aspects

HEARING loss due to industrial causes presents legal as well as medical problems. While the purpose and intent of the compensation acts of the various states might have some common features, the benefits and schedules covering occupational accident and disease vary greatly in the different states. This is particularly noticeable in dealing with the problem of occupational hearing loss.

Occupational hearing loss was not considered to be much of an industrial hazard or problem until 1947 when a large number of claims for alleged loss of hearing due to industrial noise-exposure arose in the state of New York. In 1950 a large number of claims appeared also in the states of Wisconsin and New Jersey. Shortly thereafter cases appeared in other states, notably California, Missouri, and Minnesota.

While loss of hearing resulting from mechanical as well as acoustic trauma had previously

been recognized and compensated, the new claims arising from hearing loss due to noise-exposure were met with surprise and resistance by industries and their insurance carriers. Alarmed and concerned, they felt that it was not the intent and purpose of existing legislation to compensate for this type of hearing impairment. These claims, therefore, were appealed to the Industrial Commissions and higher courts of the various states for their interpretation of the provisions of existing compensation acts.

Decisions of the higher courts have already been handed down in the states of New York, Wisconsin, Missouri, and the Federal Courts of New York.[1] These have upheld the right of the worker to claim compensation for hearing loss arising from industrial noise-exposure. Industry has thus learned that while it does not as yet have to protect the hearing of its employees it might be held liable for loss of hearing resulting from industrial noise.

A growing awareness of the effect of industrial noise upon hearing as well as the decisions of various higher courts have resulted in many industries taking an active interest in the problem. This interest has expressed itself in efforts to learn more about the problem and also in the establishment of industrial hearing conservation programs. This last measure is perhaps industry's most significant step toward meeting the problem.

INDUSTRIAL hearing conservation programs have a dual purpose:

1. To conserve the hearing of workers and minimize hearing loss.

2. To prevent economic loss to the employer resulting from occupational hearing loss.

The first step of an industrial hearing conservation program is scientifically to determine the intensity level and frequency characteristics of the noise present in working areas. In those industrial working areas where hazardous noise levels are present it is necessary accurately to evaluate the hearing of the employee before he begins working and periodically to recheck his hearing by means of a pure-tone audiometer.

Pre-employment hearing tests made under suitable testing conditions serve as a baseline with which all subsequent hearing tests can be compared. These tests can be made at the time of employment either by the nurse or by trained personnel. If the number of employees is relatively small this can be done at the physician's office. In industries where large numbers of workers must be tested it becomes more practical, for economic reasons, to perform the hearing tests in the Medical Department under proper medical supervision. The audiograms are interpreted by the supervising physician or otologist, and those employees showing significant hearing loss or history of ear disease are referred for otological examinations.

The pre-employment hearing test should be a complete threshold audiogram of the worker so that his present hearing can be evaluated in relation to normal hearing and subsequently compared to later measurements of his own hearing. For purposes of expediency and economy, recheck audiometric tests can be made using a screening method. Recently a small screening instrument has been developed known as the "Oto-Chek." This instrument tests only one or two frequencies in a moment's time but effectively detects changes in hearing acuity in those frequencies particularly affected by noise. It can be used in ordinary offices or first aid rooms without the need for expensive sound-treated rooms. Recently Merklein and Briskey, at the Hearing Clinic of the University of Wisconsin, at Milwaukee, have used the screening method in testing the hearing acuity of students ranging from the primary to the college level. They have found the technique to be as effective and reliable as the previously-used time-consuming and more elaborate screening methods.

It goes almost without saying that the ideal industrial hearing conservation program would reduce or eliminate hazardous noise at its source by proper designing of new machinery, treatment of existing machinery, and acoustical isolation of noisy working areas. Unfortunately, in many instances the attainment of such ideals is not always practical from an engineering and economic standpoint.

Where noise levels cannot be effectively reduced to safe limits, the hearing of workers can be protected by the use of properly-fitted ear plugs. Around jet airplanes and other industries associated with extremely high noise levels protective ear muffs are often used alone or in conjunction with ear plugs. For most commonly encountered industrial noises the use of ear plugs offers the best practical solution to the noise problem at this time. A number of ear plugs are commercially available in various sizes made of rubber or plastic. To be effective, ear plugs must be properly fitted under medical supervision.

The writer has observed that introduction of ear plugs has met with resistance on the part of workers. This initial resistance, however, was to be expected in view of similar experience with other safety devices such as safety goggles, safety shoes, helmets, etc., at the time of their introduction. However, it is gratifying to observe that workers are gradually learning that it makes good sense to protect their ears and hearing by wearing ear plugs.

Safety programs in industry have resulted in the marked reduction of the number of industrial

1. Fox, M. S.: "Wisconsin Story of the Industrial Noise Problem." *Indust. Med. & Surg.*, 26:7 (July) 1956.

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accidents and working days lost. The hazards of occupational diseases such as lead and silicosis have been reduced to a minimum. This has been accomplished by the medical man working as part of a team with the industrial engineer and the hygienist, in both the laboratory and the industrial environment.

Occupational hearing loss is the outgrowth of our huge industrial development and expansion in recent years. As physicians we believe that conservation of human hearing is worthwhile. With an understanding of the problem of industrial noise and with the cooperation of labor, management and the medical and allied professions, conservation of human hearing in industry can be accomplished.

PHYSICIANS interested in the industrial noise problem, and particularly those desiring more information about industrial hearing conservation programs, should write to the Subcommittee on Noise in Industry of the Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology. Intensive research in all phases of the industrial noise problem and particularly in the area of industrial hearing conservation has been and is being carried on by members of the research staff. Requests for information should be forwarded to the Director of Research of the Subcommittee on Noise in Industry, 111 North Bonnie Brae Street, Los Angeles 26, California.

(2040 West Wisconsin Avenue.)

Three Approaches

BASIC approaches to setting up executive health programs and improving those already in existence were recently made public by a special committee of Commerce and Industry Association of New York, Inc., after nearly a year of study. The report pointed out that while larger companies are most often the ones with an executive health plan calling for periodic examinations, few smaller companies had a plan or were interested in one. Yet, the smaller business is hardest hit by sudden loss of executive. Committee recognized three basic approaches to setting up program, each with special advantages and drawbacks under specific conditions: *In-Company-Plan* — suitable for companies which maintain professional staffs adequate for this purpose and have physical equipment and facilities to perform comprehensive examination. Executive is well acquainted with Medical Director and can be contacted readily for follow-up examination. Drawback is reluctance of executives to place themselves in care of another "employee," the possibility of "leaks" to his superiors or to other employees. *Private Physician* — simplest method offering good doctor-patient relationship, and one that is best for smaller companies. Only two out of 28 firms in committee study who used this kind of program relied entirely on physician of executive's choice; others insisted on private physician of company's choice. Reason: companies felt if each individual went to his own doctor, examinations would vary and there could be no uniformity of standards. There is also question of effectiveness of follow-up by family physician whom individuals chose to visit. *Hospitals and Diagnostic Services* — most popular with industry and has these advantages: superior equipment and experienced staff, facilities for accurate record keeping and follow-up, and executive is more inclined to accept such "impartial service," as it gives him privacy of examination and records. Hospital examinations should be on outpatient basis, and only under exceptional circumstances should executive be required to enter as in-patient. The following outline for executive examinations was recommended by Commerce and Industry Association's Medical Committee: complete history, along lines used in leading hospitals, complete physical examination, electrocardiogram, x-ray of heart and lungs, sigmoidoscopy, stool-guaiac test for blood, hemoglobin, hematocrit and examination of blood smear, serological test for syphilis, urinalysis, and other tests as indicated by symptoms and findings produced by examination. Findings of examination should be kept absolutely confidential and should not be available even to chief officers of company, committee urged. "They should be divulged only upon written consent of executive examined," it was noted, "and report should be made to him and to his personal physician if he so requests." —From *Industrial Relations News*, November 9, 1957.

The Carcinogenic Action of p-Aminobiphenyl in the Dog

—FINAL REPORT—

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BECAUSE of its close chemical relationship to benzidine, p-aminobiphenyl (PAB) was considered a possible carcinogenic agent of the urinary bladder. Until recently this material was of commercial importance in the chemical industry, and it was for this reason that its possible carcinogenic action was investigated. A preliminary report appeared in 1956.[1]

Methods

THIS study was initiated in September, 1952. Four young adult mongrel female dogs were employed. Each dog was fed per day about 75 gm of canned horse meat, and ground Purina dog pellets and crackers ad lib. During the first year, on five days of each week, purified p-aminobiphenyl was fed in a small quantity of horse meat. Beginning with the second year, the compound was administered in a capsule by mouth. An attempt was made to feed a dose of 0.3 gm per dog three times per week. With a few isolated exceptions, this schedule was maintained without difficulty. Cystoscopic examinations were made at intervals of approximately four months.

Results

TABLE I presents the data. Tumors of the urinary bladder were produced in all four dogs. The latent periods were 21, 29, 33, and 34 months respectively. In three animals the administration of PAB was continued for three to nine months after appearance of a tumor. These animals died in from four to 13 months after the first appearance of the tumors. Signs of intoxication remained negative until a tumor appeared. The only consistent observation was hematuria. This was marked in one dog, and mild in the other three. Salivation, loss of body weight and vomiting were also noted, but they were mild.

The gross and microscopic pathological changes of the urinary bladder of dog D-74 were as follows:

Gross Examination: The opened urinary bladder measured 5 cm by 4.5 cm, and the wall varied in thickness up to 1.2 cm. The most prominent feature was the presence of polypoid projections of the mucosa, most striking in the vault and measuring up to 8.5 mm in diameter. The poly-

TABLE I.
EFFECTS OF FEEDING P-AMINOBIPHENYL (PAB)
(The animals were mongrel dogs weighing approximately 10.0 kgm)

	Dog No. D-70 (D-9441)	Dog No. D-71 (D-9445)	Dog No. D-74 (D-9452)	Dog No. D-75 (D-9450)
Start of feeding of PAB	Sept. 1, 1952	Sept. 1, 1952	Oct. 3, 1952	Sept. 29, 1952
Individual dose (Capsule)	0.3 gm	0.3 gm	0.3 gm	0.3 gm
Usual doses per week	3	3	3	3
Period of time after appearance of bladder tumors	29 months	34½ months	21¾ months	33½ months
Total quantity of PAB ingested when tumors first appeared	87.5 gm/dog (8.2 gm/kgm)	129.5 gm/dog (9.6 gm/kgm)	94.5 gm/dog (8.4 gm/kgm)	144.0 gm/dog (14.1 gm/kgm)
Quantity of PAB fed after appearance of tumors	7.5 gm/dog (0.7 gm/kgm) over period of two months	None	18.8 gm/dog (1.5 gm/kgm) over period of 3½ months	35.4 gm/dog (3.4 gm/kgm) over period of 9½ months
Signs of intoxication at, and after appearance of tumors	salivation tremors hematuria	Loss of weight hematuria	vomiting hematuria	salivation hematuria ?
Diagnosis	"a low grade carcinoma with squamous differentiation"	"Multifocal papillary transitional - cell carcinoma of urinary bladder"	"a tumor of a medium grade malignancy predominantly a squamous cell carcinoma"	"carcinoma of low to medium grade malignancy"
Dog died following months after appearance of tumors	13	18	4	10

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Fig. 1.
(Dog D-74) — Urinary bladder, showing irregular papillary growth from mucosa, obscuring the ureteral openings, and causing irregular thickening of the bladder wall.

poid mucosal thickening obscured the ureteral openings, which were not identifiable. On section, the polyps were composed of a rubbery grayish-white tissue, with areas near the surface which were darker gray and somewhat friable; the muscular wall of the bladder appeared thickened and firmer than normal.

Microscopic Examination: Seven sections of urinary bladder were examined, representing different areas. All sections showed varying degrees of mucosal hyperplasia, with areas of neoplastic transformation. The hyperplastic mucosa showed areas of squamous metaplasia.

The areas of carcinomatous change showed a variable appearance. In some portions a papillary or glandular arrangement or architecture was maintained, but in other areas there was a change to a predominantly squamous type of neoplasm but without keratinizating activity being a prominent feature. In some of these areas the tumor cells showed striking variation in size, shape, staining properties, and arrangement. Some tumor giant cells were present, and a moderate amount of mitotic activity was evident. In several sections there was invasive activity, with infiltration in irregular columns between muscle bundles deep in the bladder wall. In some such areas a slight inflammatory exudate and a desmoplastic reaction were evident. The change was evidently a tumor of a medium grade of malignancy and predominantly a squamous cell carcinoma.[1]

The gross and microscopic pathological changes of the urinary bladders of dogs D-70, D-71, and D-75 were similar to the one described above.

Comment

OUR studies[1] support the findings of Walpole, Williams and Roberts[2] who completed their investigation one year before ours and who demonstrated that p-aminobiphenyl is capable of producing cancer of the urinary bladder. In our animals the dosage ranged from 87 to 144 gm per dog. These doses are much in excess of the quantities of p-aminobiphenyl which produced bladder tumors in the two beagle dogs of the British investigators. They fed from 30 to 34 gm per dog equivalent to 2.9 to 3.3 gm/kgm.

Summary

THIS report summarizes the observations made in four dogs fed p-aminobiphenyl (PAB). In dog No. D-74 tumors were first noted after 21 months following ingestion of a total of 94.5 gm (8.4 gm/kgm) of the compound. In dog No. D-70 tumors were first noted after 29 months following ingestion of 87.5 gm (8.2 gm/kgm) of PAB. Tumors were noted in dog No. D-75 after 33 months following ingestion of 144 gm (14.1 gm/kgm) of PAB; and in dog No. D-71 after 34 months following ingestion of 129.5 gm (9.6 gm/kgm) of PAB.

The significant lesion in each of these dogs was carcinoma of the bladder with predominantly squamous differentiation.

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Initiative

THE WATERS of liberty flow from one source: voluntary initiative and effort. In these complex modern days, too often we find the spring drying up for want of volunteers. Too much dependence on the arm of government. Too much turning to taxation to support what initiative once sought out. Certainly there are many things which local, state, and Federal governments can and must contribute. But personal freedoms are better preserved in a team or a partnership than through overdependence. In a free democracy like ours, less and less — not more and more — should devolve on government. . . .

—DWIGHT D. EISENHOWER

Fatal Silicosis with Complicating Infection by an Atypical Acid-Fast Photochromogenic Bacillus

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THE POSSIBILITY that atypical acid-fast bacilli that are avirulent for guinea pigs can induce fatal or progressive pulmonary disease in silicotic subjects has recently been suggested[1] through the discovery of such an organism (Strain G). It is the purpose of the present paper to describe the pathology, bacteriology and clinical features of an infection by an additional bacillus (identified as Strain R). This organism was recovered in life from a now deceased foundry employee and again at necropsy. The principal interest of the present case lies in the facts that: (a) this now constitutes the second atypical acid-fast bacillus, avirulent for normal guinea pigs, incriminated as the etiologic agent in fatal infective silicosis; (b) it proved possible to study the pathology in this disease, which was not possible in the first case; and (c) Strains G and R have since proved capable of provoking fatal disease in silicotic guinea pigs without increase in the intrinsic virulence of the organisms.[2]

Clinical Report

THE PATIENT, Mr. J. R., a Spanish-born American, who came to this country at the age of 20, died at 53 years of age. No record could be obtained indicating an industrial exposure during the first 20 years of his life. Over the period 1921 to 1949 (28 years), his occupation was that of a grinder. In the process of smoothing off rough portions on cast iron household articles, which were manufactured in the foundries in which he was employed, he used hand-grinding, abrasive-wheel type tools. It was not possible to obtain records of dust levels and the types of dust prevalent in his work area, but the patient claimed that the tasks were dusty, air jets were used to clean the work surfaces, and the metal castings usually had dust from the sandblasting process clinging to them. He never used protective devices.

The patient terminated his occupation in July, 1949, after he had experienced an hemoptysis and a radiographic diagnosis of silicosis had been made by the Staff of the St. Francis Hospital, Los Angeles, (Fig. 1A). He was confined to bed until November, 1949. On December 26, he had a second hemorrhage.

Between his discharge from the St. Francis Hospital early in 1950 and February, 1953, the patient consulted numerous physicians including

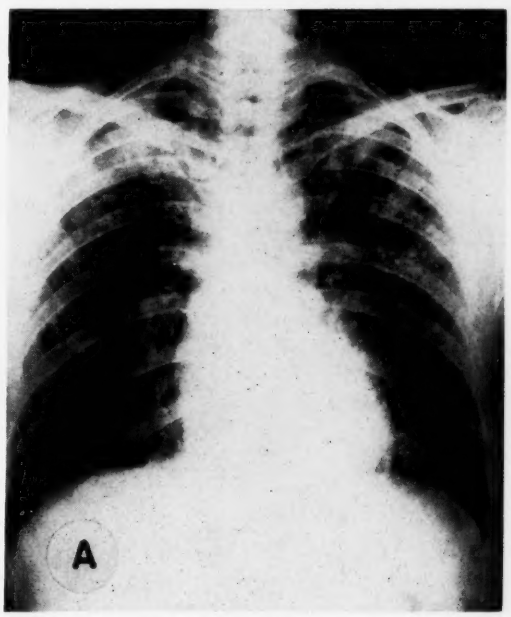

Fig. 1A.
Anteroposterior teleradiograph of the thorax of patient J. R. taken July 26, 1949. It demonstrates generalized medium mottling with consolidation of both apical regions, particularly the right.

one of us (R.H.S.). The main complaint during this period was dyspnea. Although there had not been a decisive history of physical incapacitation prior to his first admission to the hospital, the patient thereafter noticed progressive exertional dyspnea without any subjective wheezing. There were inconstant transthoracic pains aggravated by physical exertion. No cough or expectoration was present at this time except for a morning, minimal, thick, whitish sputum. Clinical examination confirmed the diagnosis of silicosis, and suggested a superimposed infiltrative disease of both upper lobes associated with slight toxemia (temperature 99° F; pulse rate, 94 per minute; resting respiratory rate, 24 per minute). The blood pressure was 150/110 mmHg. He was noticeably dyspneic. The trachea was deviated to the right. Resonance was moderately impaired over the upper half of the left lung and slightly impaired over the upper third of the right. Fine rales were present over the upper thirds of the thorax, both anteriorly and posteriorly. Fluoroscopy revealed paralysis and elevation of the left leaf of the diaphragm, which moved paradoxically on deep breathing and sniffing. The heart was displaced slightly to the right.

Numerous sputum studies were conducted including examinations for bacterial agents, neoplastic cells, and mineral contents (by spectrography). Initially these tests were all inconclusive. On June 5, 1951, the tuberculin reaction was strongly positive to .00025 P.P.D., while negative responses were obtained with Coccidioidin 1/100 and Histoplasmin 1/1000. Until February, 1953, repeated three-day sputum and gastric washing specimens proved negative for tubercle bacilli by concentration technique, culture, and by guinea pig inoculation. An anterior scalene node biopsy taken on February 16, 1952, also was negative for acid-fast bacilli, both by culture and inoculation techniques.

In spite of subjective improvement under the influence of a regimen of intermittent positive pressure breathing therapy, first instituted in November, 1951, a routine roentgenographic examination on February 12, 1953, revealed a 3 x 5 cm cavitary lesion in the left infraclavicular region. A three-day sputum specimen collected at this time proved strongly positive for acid-fast bacilli. This organism was successfully cultured at the clinical laboratory of Drs. Hammack and Maner, of Los Angeles, and was identified by one of us (C.R.S.) as photochromogenic by virtue of the orange-yellow colonies following exposure to light. On both occasions the bacillus which would not induce disease in normal guinea pigs was not *M. tuberculosis* but was recognized as being similar to the microorganism described by Buhler and Pollack.[3]

From February, 1953, to September, 1953, the patient experienced recurrent pulmonary hemorrhages with coughing spells, increased shortness of breath, and recurrent fever. A sputum specimen collected on September 1, produced, on culture, approximately 100 colonies per tube within three weeks. These colonies were yellow to tan color, glossy, soft and smeary in consistency, and contained pleomorphic, beaded, curved, claviform and diphtheroid acid-fast rods. Subcultures were obtained after 10 days. Guinea pig inoculations, however, continued to yield negative results (Table I).

TABLE I.
SENSITIVITY STUDIES
ATYPICAL ACID-FAST PHOTOCHROMOGENIC BACILLUS, STRAIN R
Cultured from Sputum Collected on 9-1-53

Drug	Interval Weeks	Dose mcg/cc	Sensitivity %
Streptomycin	3	10	99
		25	100
Sodium Para-amino Salicylic Acid	3	10	98
		25	100
Isoniazid	3	5	92
		25	100

The patient was rehospitalized in October, 1953, following a severe pulmonary hemorrhage, and on October 29, 1953, a 48-hour specimen of sputum still was abundantly charged with photochromogenic acid-fast bacilli. The results of

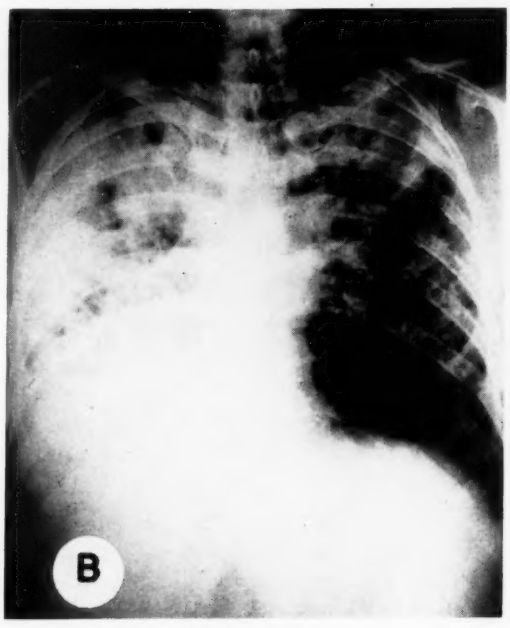

Fig. 1B.
Anteroposterior teleradiograph of J. R. taken February 9, 1954. It reveals consolidation of the right lung with suggestive multiple cavitation in the upper lobe. The heart is displaced to the right. On the left the mottled pattern persists, the lesions advanced from medium sized to large punctate shadows with a tendency to conglomeration. The left apical shadows have increased.

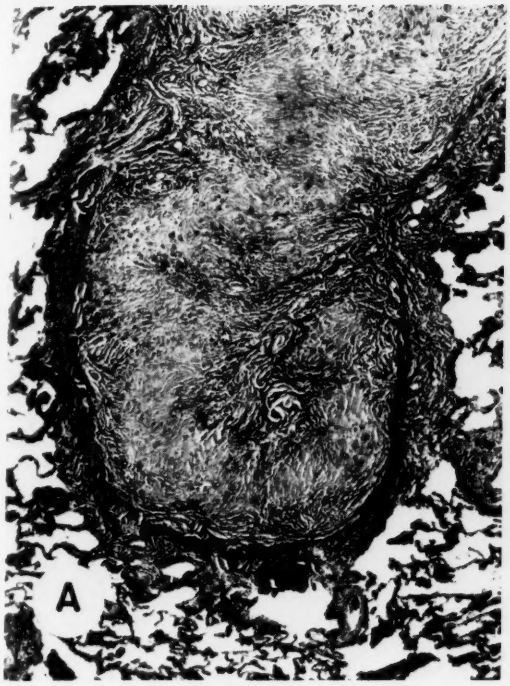

Fig. 2A.
Conglomerate fibrocellular nodules, incorporating atelectatic pulmonary parenchyma and surrounded by a layer of inflammatory cells. Deceased J. R. (Hematoxylin and Eosin, X35)

Fig. 2B.
Colliquative and semicaseous necrosis with incipient central excavation of a focus of conglomerate silicosis. Deceased J. R. (Hematoxylin and Eosin, X35)

the neutral red binding test and the oxidation-reduction dye test of Wilson, Kalish, Fish, and Patnode yielded negative evidence of virulence. Guinea pig inoculation gave a negative response. A second guinea pig was inoculated on December 27, 1953, and a localized caseous nodule, without involvement of the inguinal lymphnodes or viscera, was noted on February 13, 1954.

Chemotherapy had meanwhile been started on October 30, 1953, with the following regimen: Distrycin, 1.0 gm daily; Isoniazid, 50 mg daily; Terramycin, 250 mg daily; and Para-aminosalycilic acid, 12.0 gm daily. Although there was some general improvement in his condition, sufficient to permit his discharge from the hospital at his own request in February, 1954, the chemotherapy did not decrease the discharge of acid-fast bacilli in the persistently blood-stained sputum although the cultural and inoculation results were negative once more. The radiographs taken on February 9, 1954, showed extensive infiltration with multiple cavities in both lungs (Fig. 1B). These lesions were superimposed on the silicotic nodules previously noted. At this time, too, the patient experienced difficulty in swallowing pills. Partial paralysis of the 10th nerve, due to mediastinal compression, was diagnosed by Dr. Alden H. Miller of Los Angeles. Administration of Streptomycin, 1.0 gm twice weekly, was started on February 8, 1954. No significant improvement was effected. Instead, the patient's condition deteriorated further. Although febrile episodes continued to respond to Terramycin, relapses occurred soon after the therapy was discontinued. The terminal exacerbation was ushered in by progressive dyspnea. He died on the same day that he was readmitted to the hospital, June 4, 1954.

Necropsy

NECROPSY was performed by Edward M. Butt, M.D., Chief Pathologist, and Paul R. Thompson, M.D., both of the Los Angeles County General Hospital, Los Angeles, California. The lungs were found to be black and indurated in character with multiple large cavities lined with grey material yielding abundant atypical acid-fast bacilli identical with those recovered from the sputum during life. Significant additional findings were the following: heart weight, 560 grams with moderate dilatation of right ventricle; liver enlarged, passively congested, and displayed fatty infiltration and focal necrosis; spleen and kidneys congested. There was no evidence of dissemination of the pulmonary disease to other organs. Death was ascribed to cor pulmonale with congestive cardiac failure resulting from pneumoconiosis and pulmonary infection of a granulomatous type.

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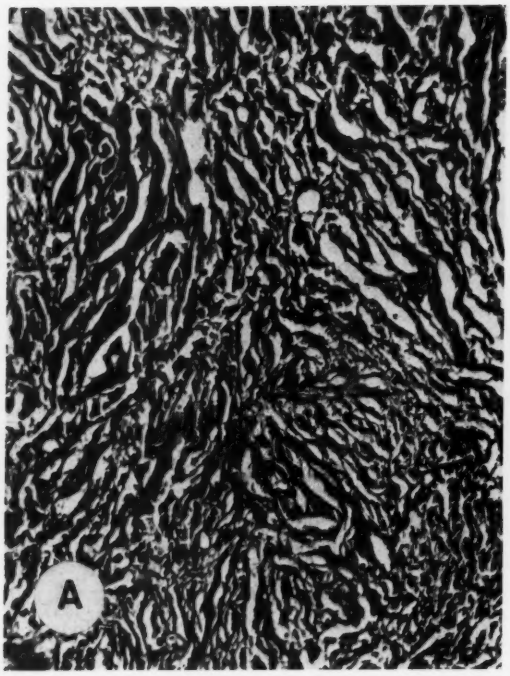

Fig. 3A.
Dense irregular collagen deposition in the lung with incipient regional hyalinization, but without whorl formation. (J.R.) (Mallory. X175)

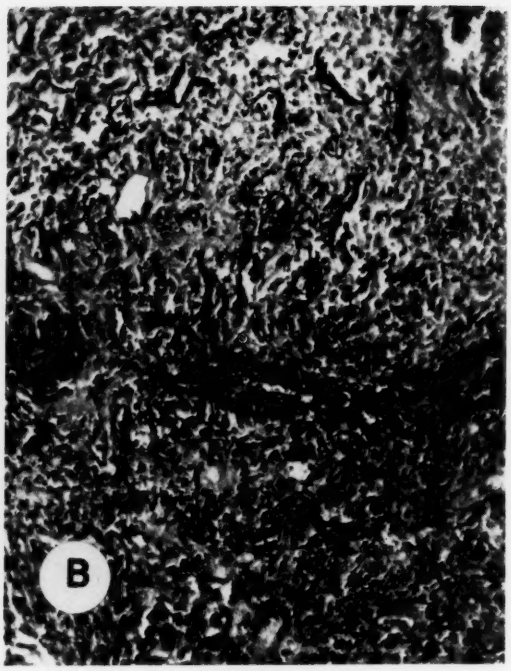

Fig. 3B.
Fragmentation of mural alveolar elastic fibers in an area of diffuse fibrosis. (Weigert. X260)

Microscopic Examinations

THE LUNGS were the seat of advanced infective silicosis. Because of secondary conglomeration of lesions, no discrete nodules could be found. Component unit lesions ranged from 0.5 mm to 3 mm in diameter, but were united into masses ranging in size from 3 mm to 30 mm. Conglomeration had been effected both by fusion of adjacent nodules and through atelectasis and inflammatory fibrosis of intervening pulmonary parenchyma.

The silicotic nodules were somewhat unusual, having remained relatively cellular and displaying little tendency to the formation of whorl patterns or the deposition of hyalinized collagen. Pigmentation predominated in most of the nodules; in others, little evidence of trapped dust could be demonstrated without recourse to petrographic methods. The majority of the nodules displayed peripheral signs of secondary infection. Thus many of the nodules were surrounded by distinct zones of inflammatory cells (Fig. 2A). Many of the nodules had undergone central necrosis and minute cavities had formed through the expulsion of the liquified contents of confluent nodules (Fig. 2B). In the peripheral and interstitial inflammatory zones necrosis also occurred regionally without preceding fibrosis. Between the nodules and in some parts quite independently of the nodules, broad tracts of dense coarse fibrous tissue could be found (Fig. 3A). Hyaline degeneration occurred sparsely in these zones. There also were multiple subpleural fibrocellular plaques and an overlying dense pleural sclerosis.

Disruption of the elastic components of the lung constituted a prominent feature of the disease process. Fragments of elastic fibers were scattered within areas of fibrosis, cellular infiltration, or necrosis (Fig. 3B). There was slight reticulin hyperplasia in the more recently involved pulmonary parenchyma, but none in the fibrotic and necrotic zones. Throughout the affected parenchyma, the vascular components of the lungs had become extensively impaired. The majority of the blood vessels were surrounded by dense fibrocellular cuffs and many blood vessels displayed irregular mural fibrosis and distortion together with focal intimal proliferation. Numerous completely or partly occluded small blood vessels were found, both imbedded in areas of dense fibrosis (Fig. 4A), and within regions which were affected by more recent inflammatory change. Pericapillary collagenosis was a prominent feature in many areas. Where cellular necrosis had supervened, alveolar mural capillaries were markedly engorged (Fig. 4B). The high degree of vascularization of these secondary lesions contrasted sharply with the ischemic character of the degenerating silicotic nodules.

There was advanced bronchitis and bronchiolitis with disorganization of these structures at multiple sites. The epithelium was extensively desquamated and multiple shallow mucosal ulcers were present. In some areas bronchi and bronchioles were occluded; in others there was focal dilatation.

Dust particles, when demonstrable, were opaque and irregular in outline and varied in size from 5 microns down. Many small crystals were discerned (Fig. 5A). Under polarized light, particles of varying grades of bi-refringence were found (Fig. 5B).

By Ziehl-Neelsen staining, acid-fast, clustered organisms could be demonstrated in many of the cellular and seminecrotic lesions. Most of these bacteria were intracellular and often were contained in the same macrophages which had engulfed dust particles.

The results of chemical analysis of a portion of the lung tissue have been summarized in Table II.

The significance of these findings is immediately evident when the values for the lung ash, the total silica, and the free silica are compared with the averages for these items in normal and silicotic subjects (Table III). The exceptionally high tissue concentrations of total silica and free silica confirm the overwhelming industrial exposure of the deceased during life and in part account for the advanced degree of disease present in his lungs. The cause of the inflammatory and necrotic components of the pulmonary process may be sought in the action of the associated bacterial agent, as inhaled silica

TABLE II.
CHEMICAL, PETROGRAPHIC, AND X-RAY DIFFRACTION ANALYSIS OF LUNG TISSUE: DECEASED J.R.
(T. M. Durkan and D. Bailey)

Item	Percent
Ash of dried lung	8.45
Total SiO_2 of Ash	45.27
of dried tissue	3.82
Free SiO_2 of Ash	25.1
of dried tissue	2.1
Mineralogic Components of Ash:*	
Quartz	25.1
Feldspar	6-12
Mica (?)	1- 3
Talc (?)	4-10
Tremolite (?)	4-10

*Since the silica content of the crystalline minerals was somewhat less than the total silica found, a small amount of other crystalline siliceous components or of amorphous silica may have been present. No cristobalite, tridymite, or diatomaceous earth was found.

TABLE III.
MINERAL CONTENT OF HUMAN LUNGS
(after T. M. Durkan)

Items	Normal: Average for 32 Subjects	Silicotics: Average for 58 Subjects
Ash (% of dried tissue)	3.0	7.4
Total Silica (% of ash)	3.4	19.9
Free Silica (% of ash)	1.2	9.3

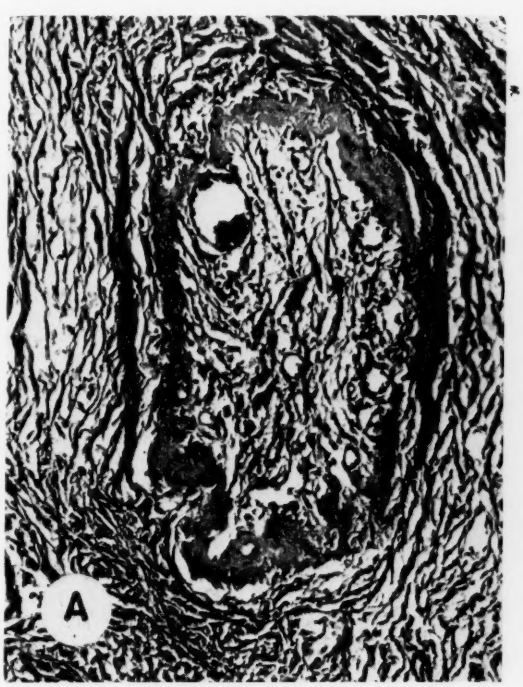

Fig. 4A.
Endarteritis obliterans in an area of dense pulmonary fibrosis. (Mallory. X260)

Fig. 4B.
Highly vascular granulation tissue adjacent to an area of necrosis in a focus of cellular proliferation. (Mallory. X260)

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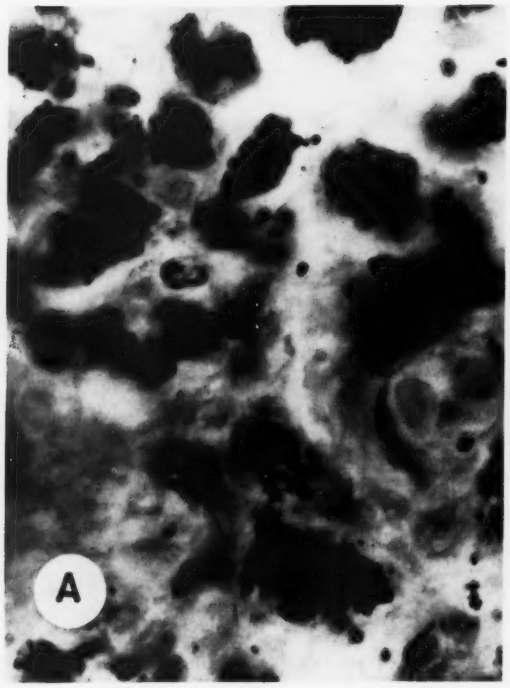

Fig. 5A.
Groups of particle- and bacillus-filled macrophages within the pulmonary parenchyma. The black granules represent phagocytized foreign bodies. In the majority of these cells the cytoplasm between the dust particles is filled with acid-fast bacilli. (Ziehl-Neelsen. X1700)

Fig. 5B.
Highly refractile particles embedded within some of the koniophores. Same field as A.
(Polarized light, X1700)

by itself does not ordinarily induce such degenerative complications. Spectrographic analysis of the lung tissue (Table IV) did not demonstrate an excess of any other known element.

Biologic Characteristics

THE ORGANISM isolated from the lungs, both during life and after death, has been identified to belong to a group of atypical acid-fast bacilli designated by Runyon[4] as photochromogens by virtue of the fact that the yellow to orange pigmentation of the colonies will not occur unless they are exposed to light during growth. If the culture tubes are covered completely during the period of growth, only a buff tinge results. The culture obtained during life and subcultures from this were studied in detail during the period 1954-1957. Ziehl-Neelsen smears made from a three week growth of the organism on inspissated egg medium (ATS) at 37° C, showed pleomorphic acid-fast bacilli which were longer and thicker than the average tubercle bacillus, and were sometimes curved, beaded, or club-shaped. An occasional branched form was observed (Fig. 6A). Individual colonies of cultures grown at 37° C, exposed to light, were deep yellow to light orange in color, smooth, raised, soft and glistening. At room temperature (21° to 25° C) the organisms grew on inspissated egg medium (ATS) at a slower rate than at 37° C. On blood agar at 37° C, pinpoint colonies of acid-fast bacilli appeared in two weeks. On this culture medium, the organism developed a beaded character (Fig. 6B). Subcultures of these colonies to the inspissated egg medium produced a profuse chromogenic growth in three weeks at 37° C. The organisms showed marked catalase activity and were neutral red negative. No cord formation was observed in Dubos' liquid medium containing 0.5% human serum (Fig. 6C). Though when freshly recovered from the sputum the bacilli were sensitive to Streptomycin, Sodium para-aminosalicylic acid and Isoniazid (Table I), the organisms became after repeated subcultures, resistant to 10 mcgm Streptomycin, 10 mg percent of Para-aminosalicylic acid, 10 mcgm Isoniazid, and 50 mcgm Viomycin per ml of medium.

TABLE IV.
SPECTROGRAPHIC ANALYSIS
LUNG TISSUE: DECEASED J.R.
(Furnished by Edward M. Butt, M.D.)

Element	Mg. per 100 gm. dry tissue
Pb	0.16
Mn	0.8
Cu	1.04
Zn	5.6
Fe	400.00
Ca	24.0
Al	7.12

Animal Virulence

GUINEA PIGS: Thirty-one guinea pigs were inoculated at different sites with varying amounts of the organisms. Transitory infection was limited to the lymph nodes draining the loci of infection and in no instance was progressive disease observed. Varying degrees of skin hypersensitivity were elicited in the inoculated animals with 0.1 mg of 3% Old Tuberculin given intracutaneously (Table V).

TABLE V.
NECROPSY FINDINGS IN GUINEA PIGS INOCULATED WITH ATYPICAL ACID-FAST BACILLI ISOLATED FROM PATIENT J.R.

Number of Animals	Route of Inoculation	Size of Inoculum	Number of Animals			
			Without Evidence of Infection	Disease Limited to Lymph Nodes	Progressive Disease	Fatal Disease
5	Intracutaneous	0.1 mg.	4	1	0	0
10	Intracutaneous	0.2 mg.	8	2	0	0
10	Inhalation	Heavy Suspension aerosol	0	10	0	0
8	Inhalation	0.1 mg.	0	8	0	0

Fifteen animals were inoculated intracutaneously, five with 0.1 mg and 10 with 0.2 mg of the organism. Two animals were killed four and eight months and the remainder 12 months after infection. Evidence of infection was found in the lymph nodes of the animals killed at the four-month period.

Ten animals were inoculated by the inhalation route. Pairs of these animals were killed four and eight months and the remainder 12 months after infection. The only evidence of infection in this group of animals was slight enlargement of the tracheobronchial lymph nodes in three of the animals killed four months after inoculation.

The 25 guinea pigs inoculated by the intracutaneous and inhalation routes were the control groups in an experiment in which this atypical acid-fast organism was inoculated into groups of silicotic guinea pigs.

Eight guinea pigs were inoculated intracardially with 0.1 mg of bacilli. Pairs of the animals were killed one, two, three, four, and six months after infection. By this route of inoculation, the disease was limited to the hepatic lymph node which was found enlarged in all animals at each sacrificing period. Intracutaneous skin tests made with 0.1 mg of 3% O.T., six weeks after infection, caused a three plus reaction in two of the animals and a two plus in six.

CHICKENS: Two chickens (Rhode Island Reds) were inoculated intravenously with 1 mg of the organisms suspended in 1 ml of 0.85% NaCL solution. One chicken was killed one month and

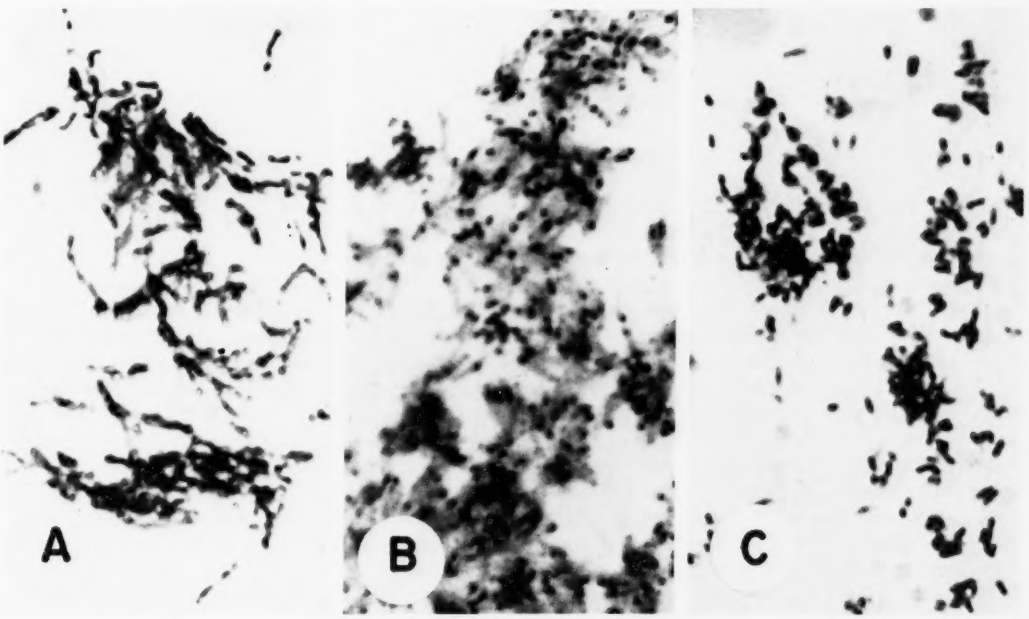

Fig. 6A. Fig. 6B. Fig. 6C.

Fig. 6A. Strain R photochromogenic acid-fast bacilli recovered during life, prior to chemotherapy, from the sputum of silicotic subject J. R. Pleomorphism, branching, and ghost forms are demonstrated and a refractile capsule seems to be present (Organisms grown on standard A.T.S. inspissated egg medium. Ziehl-Neelsen. X1700) Fig. 6B. Demonstrates the beaded character of the Strain R photochromogenic acid-fast bacilli which develops when the organisms are grown on blood agar. (Ziehl-Neelsen. X1700) Fig. 6C. On Dubos' liquid medium containing 0.5% human serum, the Strain R photochromogenic bacilli fail to demonstrate cord formation (Ziehl-Neelsen. X1700)

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the other, two months after infection. No evidence of gross tuberculosis was observed.

RABBITS: Two rabbits were inoculated intravenously with the organisms. One rabbit received 0.01 mg and the other 1.0 mg of the organisms suspended in 0.85% NaCL solution. Both animals were killed two months after infection. No evidence of tuberculosis was found.

MICE: Three mice (Olitsky strain obtained from the University of Southern California Medical School but originally derived from the Swiss White strain of the Rockefeller Institute for Medical Research) were inoculated intravenously with 0.3 ml, each, of an aqueous suspension of organisms having a density equivalent to that of the McFarland No. 10 $BaSO_4$ tube. This suspension strength is given by McFarland as equivalent to approximately 3,000,000,000 bacteria per ml. Thus undoubtedly, each mouse received well over 1 mg moist weight of bacillary growth. One mouse died at 17 days, the second at 22, and the third was sacrificed at 22 days. In the first two mice the lungs were closely studded with 1 mm nodules. Other than some splenic enlargement, no further gross disease was seen in any of the animals. Microscopically, there was granulomatous disease of the lungs, liver, spleen, and kidneys, being more extensive in the first two. All lesions contained large numbers of large, beaded, acid-fast bacilli.

Dr. Edwin A. Brosbe, Chief of Tuberculosis Research at the Long Beach Veterans Administration Hospital, Long Beach, California, also inoculated three mice with the bacillus intravenously. The white strain of mice used here was also a derivative of the Rockefeller Swiss White strain. The dose was 1 mg moist weight per mouse. In this case the weighing was meticulous. One mouse died in 37 days, the lungs were rated grossly as plus 3 (plus 1 to plus 4 scale), the spleen was enlarged, and the kidney was rated as plus 1. The remaining two mice were sacrificed and the lung disease in each case rated as plus 1. The spleens were enlarged but the other organs appeared normal. Microscopically, granulomatous lesions containing large acid-fast bacilli were found in the lungs, liver, spleen, and kidneys.

Intravenous inoculations were again performed at the Saranac Laboratory, Saranac Lake, New York, two years later. Three mice, strain D.B.A.-1, obtained from the Jackson Memorial Laboratory, Bar Harbor, Maine, each received 0.5 mg of the organisms suspended in 0.85% NaCL solution. The mice were killed two months later. No evidence of a granulomatous reaction was found.

HAMSTERS: Four hamsters were used. Pairs of the animals were inoculated subcutaneously in the right groins with 1.0 ml of a suspension containing 5.0 mg and 0.5 mg of the organisms respectively. Two animals, one given the large dose and the other the small dose, were killed in two months. The remaining two animals were killed in four months. There was no ulcer at the site of inoculation in these animals. The infection caused enlargement of the right inguinal lymph nodes with slight enlargement of the right iliac lymph nodes.

Comment

DURING the past three decades tuberculosis has taken second place in relation to cor pulmonale as the principal cause of death in silicotics.[5] This change was brought about largely by almost universal improvement of occupational hygienic standards, the introduction of preemployment and periodic examination of personnel exposed to industrial dusts, and general improvement in the infectivity rate for tuberculosis as a result of effective public health measures. With the recent advent of specific chemotherapy for tuberculosis, hope arose in industrial circles that the tuberculous complication of silicosis would soon be eliminated. While there is reason for optimism, the failure of chemotherapy to attain this ideal in the infectious complications of silicosis, calls for some caution.

One of the perplexing problems of silicosis concerns the occurrence of pulmonary lesions, which are clinically and radiographically suggestive of tuberculosis, but in which cases viable tubercle bacilli cannot be recovered from the sputum. Not infrequently in such cases, atypical acid-fast bacilli may be found. These are generally designated saprophytes.

It has been assumed generally that the absence of tubercle bacilli in the sputum of silicotic patients with clinically apparent tuberculosilicosis may be due to the innate character of the underlying disease. Organisms seem to be "bottled-up," either on account of the proliferative nature of the pneumoconiosis or through occlusion of bronchial passages. Suspicions about the etiologic role of the concomitant atypical acid-fast bacilli, not infrequently recovered in silicotics with advanced disease, have been tempered by the repeated demonstration of their avirulence for guinea pigs. Feldman[6] described one such example in a silicotic. At the Silicosis Bureau in South Africa, such atypical acid-fast bacilli have been isolated on numerous occasions from the sputum of miners thought to be suffering from silicosis complicated by tuberculosis.

The recent demonstations by Buhler and Pollak,[3] Crow, *et al*,[7] and Timpe and Runyon,[8] that some virulent strains of acid-fast chromogenic bacilli, which are not yet classified as *Mycobacteria*, can cause progressive and fatal pulmonary disease, has posed the question whether such virulent bacterial agents may perhaps play a significant role in the production of infectious

complications in silicotics. By analogy with the experiences with avirulent tubercle bacilli in silicotic guinea pigs (Policard,[9] Gardner,[10] and Vorwald, *et al*[11,12]), it is but one step further in logic to query whether avirulent, atypical, acid-fast bacilli can also be a factor in the genesis of fatal chronic granulomatous infectious complications in silicotics. The present case, and that previously recorded[2] tend to substantiate this possibility.

The discovery of two cases poses the question whether the infectious complication of the silicosis was caused by the same organism in each instance. The biologic characteristics of Strains G and R have therefore been compared in Table VI. In the majority of respects, the two strains resembled one another. There were certain decisive differences, however, between the two organisms. Morphologically the bacilli were readily distinguishable, strain G consisted predominately of short, solid-staining, acid-fast rods while the component bacilli were long and beaded in the case of strain R. Branching also was considerably more common and assumed a more complicated pattern in strain G than in strain R. The capacity to produce pigment clearly further differentiated the two strains from one another as Strain R proved to be a photochromogen, whereas strain G yielded no pigment on A.T.S. medium, both at room and at incubator temperatures. Strain R also grew somewhat faster.

TABLE VI.
COMPARISON OF THE BIOLOGIC CHARACTERISTICS OF TWO STRAINS OF ATYPICAL ACID-FAST BACILLI

Observation	Strain G	Strain R
Type of Growth on Solid Media	Smooth to rough Pasty Easily miscible in aqueous diluents	Smooth Pasty Easily miscible in aqueous diluents
Cell Morphology	Predominantly short Predominantly solid Pleomorphic Ramification common	Predominantly long Predominantly beaded Pleomorphic Branched forms rare
Pigment Production		
in dark	None	None
in light	None	Orange to yellow
Growth at 37° C.		
A.T.S. medium	Good — 21 to 28 days	Good — 10 to 14 days
Dubos' Liquid medium	Good — 6 to 8 days	Good — 6 to 8 days
Growth at 24° C.		
A.T.S. medium	Slow: 28 to 42 days	Moderate: 28 to 35 days
Blood agar medium	Slow: 10 to 14 days	Slow: 10 to 14 days
Saboraud's medium	Slow: 28 to 35 days	
Cord Formation	None	None
Neutral Red Test	Negative	Negative
Catalase Activity	Marked	Marked
Pathogenicity for normal		
Guinea pigs	None	None
Chickens	None	None
Rabbits	None	None
Hamsters	None	None
Mice	None	Virulent (in large doses)
Silicotic guinea pigs	Fatal pulmonary disease without dissemination	Fatal pulmonary disease without dissemination
Pathogenicity for		
Sensitivity of Infected Guinea pigs to Old Tuberculin	Moderate	Slight
Drug Sensitivity prior to Chemotherapy		
Streptomycin	Totally resistant	Partially resistant initially
Para-aminosalicylic acid	Totally resistant	Partially resistant initially
Isoniazid	Totally resistant	Partially resistant initially
Viomycin	———	Totally resistant

The conflicting response in the mice requires explanation. The most probable explanation seems to be that repeated subculturing may have rendered the strain less virulent for mice than it was shortly after recovery from the patient. However, it is possible that the higher dosage initially employed was of critical significance.

The partial resistance but predominate susceptibility of strain R to Streptomycin, Para-aminosalicylic acid, and Isoniazid, appeared also to differentiate this strain from strain G, which was drug resistant. It was of note, however, that strain R bacilli were resistant to Viomycin. The bacilli recovered at necropsy in the case of strain R were resistant to all of the above drugs.

The differences between the two strains may be sufficiently important to justify the inference that more than one variety of atypical acid-fast bacilli can cause fatal infectious complications in silicotic subjects.

The course of the clinical disease was not materially dissimilar in the two patients. The syndromes differed in comparable ways from classic cases of tuberculosis complicated by silicosis. The marked tendency to recurrent hemorrhage, the response of episodic febrile bouts to Terramycin therapy, and the progressive pulmonary excavation while under drug therapy, were distinctive features. Thus, while it is clear that the two strains of atypical acid-fast bacilli induced lesions which differed from tuberculosilicosis in certain respects, the observed biologic differences between the two strains were not reflected in variations of the clinical features of corresponding magnitude.

Attention is drawn to the lack of spread of the pulmonary infection to other organs in these cases. This nondissemination was confirmed in the guinea pigs which were exposed to quartz dust and then infected by the two strains of bacilli. This observation suggests that in both instances the local pathogenicity was determined by the presence of dust, probably chiefly by the retained free silica.

The question now arises whether these bacilli could have caused tissue damage in the absence

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of inhaled dust. The majority of the chromogenic, atypical, acid-fast bacilli described have been virulent for human tissues, and though avirulent for guinea pigs, have demonstrated virulence for hamsters. With strains G and R, hamsters proved resistant. A positive response was, however, produced in mice when large doses of freshly recovered bacilli (Strain R) were used. Experience to date does not suggest that these organisms are highly infectious nor the disease highly contagious. Reduced tissue resistance seemed to be a necessary factor in the case of strains R and G and in this sense they are fortuitous pathogens.

Both of these strains perhaps can be distinguished definitely from human tubercle bacilli by the lack of pathogenicity for guinea pigs, cultural aspects, resistance to drugs, lack of cord formation, and negative neutral red reaction. They can be differentiated from bovine and avian tubercle bacilli by nonpathogenicity for rabbits and chickens.

The explanation for the development of a positive tuberculin reaction in the case under discussion and in the guinea pigs infected with both strains R and G may reflect cross allergenicity characteristic of various *Mycobacteria*. This phenomenon suggests that, though these bacilli are atypical to the degree described, they have some taxonomic relationship to the *Mycobacterium tuberculosis*.

The high vascularity of the lesions and the tendency to cellular necrosis contrast with the ischemic necrosis of tuberculosilicotic lesions and the prolonged preservation of koniophores in the latter condition. This feature hints at the probability that the disease process induced in silicotic subjects by the atypical avirulent acid-fast bacilli may more regularly pursue a serious course than does tuberculosilicosis due to *Mycobacterium tuberculosis*. No doubt part of the tissue vascularity and necrotizing trend may be ascribed to the secondary infection which was due to invasion of the pneumoconiotic zones by staphylococci and streptococci. Such secondary infection is not common in cases of tuberculo-silicosis proper.

Summary

1. A CASE of fatal silicosis, in which an infectious complication was induced by an atypical photochromogenic acid-fast bacillus, is described.

2. The clinical course was characterized by episodic febrile phases, recurrent pulmonary hemorrhages, increasing pulmonary insufficiency, and despite drug therapy, progressive bilateral cavitation.

3. The disease was limited to the free-silica-laden pulmonary tissues, and the pneumoconiosis was characterized by multifocal necrosis, hyperemia, and vascular damage.

4. The biologic characteristics of the causative organism and its avirulence for a wide range of experimental animals, served to differentiate this bacillus from the *Mycobacterium tuberculosis*.

5. The biologic significances of this discovery are reviewed.

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He Doesn't Know

IN AN ADDRESS entitled "Values," given at the convocation of Temple University College of Pharmacy, September 25, 1957, Henry S. McNeil, President of McNeil Laboratories, Inc., offered advice to the student pharmacists: "Tell your neighbor that each year medicines become more potent and that the pharmacist's personal responsibility becomes proportionately greater; remind him of the fact that those 2,000 medicines which must be carried are there for him should he contract anything from canker sores to carcinoma; let him know the pharmacist must learn drug potencies and dosages to act as a double-check on the physician's prescription; explain that pharmacy encompasses a vast professional chain from researcher to manufacturer to wholesaler to pharmacist; describe with pride the nationwide professional service performed daily by our 53,000 drugstores working with 10,000 registered men in industry. . . . Don't take for granted your neighbor knows them — he doesn't!"

The Common Cold— What Is Being Done About It?

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THE COMMON COLD with its resultant absenteeism is well-known as the number-one health problem of industry. In the majority of industries it accounts for at least 50% of all absences, and near 25% of the total time lost. This amounts to more than 150 million work days annually. And the cost is constantly increasing. Higher wages, the enactment of state disability laws, the liberalization of sick benefit plans, including the trend to cut the waiting period — all these steadily augment the already staggering expense of the common cold. Probably, however, the greatest loss comes not from wages but from production, as this applies not only to the worker who is absent, but also to the one who tries to stay on the job, and, because of his cold, has greatly impaired productivity.

WITH this tremendous cost, why hasn't something been done about it?

There have been two deterring factors: a lack of funds to support a real research program, and a research roadblock. As to lack of funds, the common cold not being a direct killer or crippler has not had attention focused on it as have some of the more dramatic diseases. Also it has only been in the last decade that management and health authorities have become really aware of the magnitude of the problem it presents.

Probably the first real awareness came during World War II, when every production hour lost could literally be translated into casualties on the battlefield. Then, too, as jobs have become more specialized, the flexibility of employees has decreased. Now it can't always be "Let George do it — Joe is home with a cold."

The research roadblock was created by the inability to adapt cold research to small inexpensive laboratory animals. The fairly recent discovery of a technique whereby viruses can be grown in test tubes has apparently solved this problem.

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RECOGNIZING that a practical solution could come only through extensive researches into the basic causes of colds, a group of industrial and medical executives organized the Common Cold Foundation — a nonprofit service organization now receiving funds from about 150 companies.

The main objectives of the Foundation are:

1. To channel every dollar possible directly into support of research into the cause and cure of the common cold, to the end that it may be eliminated or controlled.

2. To inaugurate and disseminate all current information that will assist in making the control of respiratory diseases more effective, for mankind in general and particularly in relation to industry.

3. To act as a clearing house for the collection and dissemination of advanced knowledge and information on the common cold.

Research projects are now being supported at four universities. These are primarily concerned with isolating the viral agents causing colds. As rapidly as funds permit other projects will be started: (1) on basic research into the common cold; and (2) into such areas as the incidence of adenovirus-caused respiratory illnesses in civilian population; the role of hypersensitivity; the influence of local irritants; psychogenic factors; and the relation of colds to chronic irritants.

THERE has been some progress. The first real break-through came with the isolation of a group of viruses, now known as the adenoviruses. Nineteen different types of these have been identified. Eleven appear to have some relation to human disease. Types 1, 2, 3, 4, and 7 have been associated with reasonably well-defined clinical illnesses. Vaccines are being tested for these types.

Recently there was announced the development of a vaccine for the "J.H." virus, a viral agent believed to be responsible for a modest fraction of the so-called common or garden variety of the common cold.

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A similar viral agent (2060) was independently described by Drs. Pelon and Mogabgab, of Tulane University School of Medicine. However, Dr. Mogabgab's original work in isolating this viral agent was done at the Great Lakes Naval Training Center, in Illinois.

The "J.H." virus isolated by Dr. Winston Price, of Johns Hopkins University, is named after the University, where it was originally isolated from nasal washings obtained from student nurses. According to Dr. Price it is not in any way related to the adenoviruses. He says it cannot be cultured in the same way as the adenoviruses. The symptoms are mild and could be termed "cold-like." They include coryza, mild sore throat, low grade fever (never over 100° F), and slight malaise. There may sometimes be a cough. The condition usually lasts from two to five days.

While these advances are interesting and hopeful, they in no way offer a complete answer to the common cold, since they involve only a small part of the entire spectrum of the common respiratory diseases. They do, however, emphasize two important conclusions:

1. The new techniques are proving effective in securing basic knowledge as to precise causes of types of colds.

2. The development of these techniques makes evident the fact that if science is given the proper financial support this costly and annoying disease can be "licked."

THE announcement of these vaccines poses a question for industrial Medical Directors, namely, should their use be recommended?

Regarding the adenovirus vaccines, the only ones now available, Dr. Maurice R. Hilleman, Chief, Department of Respiratory Diseases, Walter Reed Army Institute of Research, who developed the bivalent types 4 and 7 adenovirus vaccines, was asked for a statement.

Dr. Hilleman said, "I am glad to offer an opinion concerning the use of the vaccine. Certainly, we who have developed vaccines should bear part of the burden of keeping the record straight.

"As you know, there has been no published report to date covering the determination of adenovirus-caused respiratory disease attack rates in industrial workers. All opinions and decisions must be extrapolated, therefore, from the rather meager data on incidence in the adult civilian population in general.

"Any attempt to appraise the need for adenovirus vaccine in a particular population group must be viewed from the standpoint of (a) the degree of effectiveness of the vaccine in preventing the disease proved in field evaluations, (b) the attack rate for the disease in the population group under consideration, and (c) the socioeconomic implications of the occurrence of the disease itself. Unless these factors are viewed from their proper perspective, the unwise decision to use vaccines in situations in which there is little or no chance for significant benefit may result.

"The high level of effectiveness of the adenovirus vaccine in preventing acute respiratory illness in military populations is without question.

"The bivalent types 4 and 7 adenovirus vaccine, first evaluated in a controlled field study at Fort Dix, New Jersey, during 1956, was shown to reduce the expected occurrence of adenovirus-caused hospital cases of respiratory illness by 98%. The reduction in respiratory diseases, all causes, in the epidemic was 81%.

"In a second controlled field study of the bivalent vaccine carried out at Fort Leonard Wood, Missouri, during 1957, the reduction in hospital cases of adenovirus-caused respiratory illness, all causes, was 57%. The reduction in adenovirus-caused respiratory illness specifically, was about 90%.

"A trivalent types 3, 4, and 7 vaccine evaluated during 1956 was found to reduce the attack rates for febrile respiratory illness, all causes, by 57%.

"The importance of adenovirus-caused respiratory illness in military recruit populations is, without question, causing hospitalization of roughly 10% of all recruits throughout the year for a period of about 10 days. In striking contrast to recruits, however, the incidence of adenovirus-caused respiratory illness among the cadre or 'seasoned' military groups is very low, and this is true also of the adult civilian population, based on reports presently available.

"In summary, it should be noted that adenovirus-caused respiratory disease is a benign and spontaneously regressive illness of relatively infrequent occurrence in adult civilians. Based on the present indication of low incidence, general use of the vaccine in adult civilian populations at this time is not justified and cannot be recommended.

"Cognizance should also be taken that adenovirus vaccine is not a common cold vaccine. In fact, in the study at Fort Dix, mentioned above, the vaccine was essentially without effect in reducing the incidence of mild febrile or afebrile respiratory illnesses falling into the clinical category of the common cold."

All of the foregoing underlines two most important considerations: (1) the common cold is without doubt caused by viruses, and the new methods do permit progress to be made in its study; (2) there is need for a concentrated research program at this time, as each day of delay is costing industry millions of dollars.

The Value of Early Diabetes Detection

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SEVERAL years ago we wished to design a study which would detect diabetes as early as technically possible and at the same time determine whether such a program would be of value. A number of communitywide studies have been made in recent years[1] but these have, in the main, been one-shot affairs with somewhat limited means of follow-up. While our group would be smaller, we knew we would have the advantage of a close follow-up.

The early detection of diabetes obviously calls for some laboratory procedure. Neither the urine sugar test nor the fasting blood sugar seemed quite sensitive enough for our purpose but the postprandial blood sugar showed promise of being satisfactory. We first instructed our patients to have an especially sweet breakfast on the morning of the examination. We soon found, however, that three teaspoons of sugar was a sweet breakfast to some people while others would take 10 teaspoons of sugar. In order to make the test somewhat more uniform, we decided to give each person 50 grams of glucose to be taken along with his usual breakfast. Since the work of Mosenthal[2] has shown that as little as 15 grams of refined sugar will pass the barrier of the liver, the dose of 50 grams is quite adequate for diagnostic purposes. This procedure is in effect an abbreviated glucose tolerance test.

In our first pilot study we used the supervisory and executive personnel of our company and made the postprandial blood sugar estimation a routine part of our periodic health inventory. The first 400 persons in this group form the basis for this analysis. From this 400 persons, we drew a total of 628 blood specimens. These specimens were drawn as close as possible to two hours after the sugar was ingested.

Readings were distributed as follows:

Under 80 mgm/%	128 specimens
80 to 119 mgm/%	436 specimens
120 to 129 mgm/%	22 specimens
130 to 139 mgm/%	18 specimens
140 mgm/% and over	24 specimens

As can be seen, the majority of individuals were able to bring the blood sugar back to normal fasting levels by the second hour after the test meal.

After some additional study of selected individuals, we divided these 400 persons into the following groups:

1. Normal — 377 individuals.
2. Definitely diabetic — six individuals.
3. Borderline or "pre-diabetic" — 17 individuals.

We secured a complete glucose tolerance test on all individuals with a blood sugar reading of 120 or higher. We also have records of glucose tolerance tests on a sizable sample of those in the normal category. From this study several observations can be made:

1. Under the conditions of this test we could say with a high degree of certainty that anyone whose blood sugar is 120 or less does not have diabetes.

2. A blood sugar in the range of 120 to 130 almost certainly rules out diabetes. In only one instance did we find a person with a reading of 129 or less who was later diagnosed as having diabetes. This specimen was taken early in the course of his disease. His case (S.X.) will be discussed in detail later.

3. A reading between 120 and 130 often indicates a slight disturbance of sugar metabolism which we designate as "pre-diabetes."

4. A person with true diabetes will almost certainly have a reading above 140. In only two instances did persons we considered diabetic have single specimens in the range of 130 to 139. Both of these persons (O.E. and N.I.) had a mild disease and were at the time in that borderline zone between "pre-diabetes" and true diabetes. Their case histories are discussed below.

5. An occasional normal person will have a single specimen which will give a reading above 140. Of our 10 such persons, three were found to be normal on further examination.

High Blood Sugar in Normal Individuals

THIS question has interested us considerably. Why should an individual turn up with a single specimen containing between 120 and 170 mgm/% of sugar when most or all of his other readings are normal? Probably several factors are operating. As yet we have been unable to find any completely satisfactory answer.

In a few instances we know that black coffee without sugar has been taken or a cigarette has

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been smoked, but we have wondered just how much significance we should place on these. Coffee and tobacco are often given credit in conversation for an ability to raise the blood sugar, but if any definitive work has been done with these two agents it either has not been reported in readily available medical literature or has been indexed in such a way that we were unable to find it. What little work has been done[3] supports our clinical impression that the reaction is quite variable and that the same individual may show a different reaction on different occasions.

CASE No. 1. Our first case, E.Q., illustrates this variability of response to coffee. After having had a postprandial blood sugar of 96 on his first examination in 1951, he came up with a reading of 169 mgm/% in 1953. Upon presenting the findings to the patient, he asked if black coffee might have interfered with the test. He stated that, not thinking that it would interfere with the test, he had had some coffee without cream or sugar about 15 minutes before. Recheck tests two hours after a breakfast containing a full 50 grams of glucose revealed readings of 78 and 81.

It is interesting to note that this man had, in 1953, just recently been transferred from a branch where the "coffee break" was somewhat inconvenient, and he was, at that time, drinking only two cups of coffee most days.

We retested the patient in 1955, after the "coffee habit" had been firmly established, and found that now coffee failed to raise the blood sugar above 108 mgm/%. In the meantime we checked six other individuals before and after drinking one or more cups of unsweetened coffee and found no consistent rise in the blood sugar level. In fact, in no case did we get a reading exceeding 110 mgm/%. All six were "coffee break" enthusiasts.

In three instances the relatively high readings can be explained on the basis of an antihistamine or other medication taken for the control of allergy. We know that some of the high readings occurred after smoking. Since we also know that many of those with readings below 120 also smoked, this at best, is a variable factor. We continue to recheck those whose blood sugar values fall above 120, and may eventually come up with a more definite answer to this interesting though minor point.

Patients with Diabetes

IT MUST be emphasized that the entire group of 400 persons includes only those with no history or symptoms suggesting diabetes. Where either symptoms or history were suggestive we excluded them from this group and immediately performed a more complete glucose tolerance test. As a result of this selection, all cases of diabetes discovered with the postprandial blood sugar test were mild and most could be controlled without resort to insulin.

Perhaps the value of this testing program can be best illustrated by recounting the course of several representative cases. We have been fortunate in having very good relations with the family physicians treating many of our patients. We are thus able to follow their course more closely than would otherwise be possible.

CASE No. 2. O.E., a white male now 47 years of age, is an interesting case about whom we have considerable data. In 1951 he had a blood sugar of 142 mgm/% after a non-standard "sweet breakfast." He had three glucose tolerance tests during that year. One was done after his usual diet, the second after a low carbohydrate diet, and the third after a high carbohydrate diet. It will be noted from the curves that the less carbohydrate in the diet, the lower the fasting blood sugar, and the quicker the sugar level returned to 120 or below. In all three instances however, the high point of the curve reached from 228 to 233. *In no case was the morning urine specimen positive for sugar.*

Mr. O.E. Hour	(1952) Low CHO diet	(1952) Normal diet	(1952) High CHO diet	1955
Fasting	97	113	131	141
½ hr.	197	195	228	240
1 hr.	228	233	233	266
2 hr.	131	175	225	224
3 hr.	110	109	125	152

As we followed him from 1951 to 1955 his fasting blood sugar gradually showed an elevation from 97 to 141. Of six specimens taken about two hours after his usual meal only one was higher than 146.

Here then, is a case of mild diabetes which was discovered in 1951 by the postprandial test but would not have been discovered by either urine test or fasting blood sugar until four years later. Between his pre-diabetic state in 1951 and his definite diagnosis in 1955 he followed dietary suggestions with a reasonable degree of consistency. He did, however, indulge in beer rather frequently. We have the clinical impression that alcohol and diabetes do not go well together. (See Case No. 3.)

CASE No. 3. Another case illustrates the futility of depending only on the urine. Mr. S.X., a white male, is now 57 years of age. Urine examinations from 1946 through 1954 showed at most a trace of sugar except during the course of a glucose tolerance test. In fact even today he has difficulty convincing two of his friends that he has diabetes. The friends' urines so regularly reduce test reagents that they cannot understand how he can so constantly have a negative urine and still have diabetes.

In 1949 his fasting blood sugar was 118, but

wo hours after a test breakfast the reading was 48 mgm/%. In 1950 a glucose tolerance curve showed him still able to return the blood sugar to 85 by the third hour even though his level was 250 mgm/% at the first hour.

By late 1951 his fasting blood sugar was climbing to a level of from 130 to 148 even though he was still able to bring his between-meal level to 91 after a meal containing meat, potatoes, and vegetables.

He illustrates a point which seems to be of considerable importance. Alcohol does not go well with diabetes. He has never, to my knowledge, had so much alcohol that it prevented him from reporting to work in good condition, but he liked several highballs every evening. He has, for years, been short of breath, and puffed and panted on the slightest exertion. It was not until his between-meal blood sugars began to stay consistently above the 150 level that we were able to convince him that he must eliminate the alcohol. In about two months he was able to indulge in considerable exertion without puffing and panting.

He is now on small doses of insulin (10 to 15 units) or small doses of Orinase with a diet restricted only by the elimination of rapidly absorbed carbohydrates and the elimination of alcohol.

CASE No. 4. N.I. illustrates the point that with the postprandial test it is often possible to pinpoint to within a relatively few months the time when a person goes over the line from normal to diabetes. In 1948 and 1950 he was normal while in 1952 the after breakfast level was 130 and the urine was 3+. His tolerance curve started at 127 fasting, reached 242 at one hour, and returned to the fasting level at three hours.

CASE No. 5. I.B.G. illustrates perhaps more dramatically the normal fasting blood level in early diabetes. His fasting level was 109, but in spite of this his tolerance test reached the level of 315 and was still 209 at the end of the fifth hour.

Pre-diabetes

OUT OF this group of 400 asymptomatic individuals, we classified 16 as having some disturbance of their sugar metabolism but a disturbance so mild that the diagnosis of diabetes was not justified. They all had negative after-breakfast urine specimens. In all 16 instances the glucose tolerance curve reached a high point above 175 mgm/% but returned to 120 or below by the third hour. This is a group that arouses our curiosity and will be watched over the next few years with considerable interest.

Theory of Adult Diabetes

THE VALUE of discovering these so called "pre-diabetics" might perhaps be open to some question. There are two factors which make us feel that this discovery is worthwhile:

1. We are working under the assumption that improved dietary habits may at times prevent the development of diabetes altogether.

2. Even though the first assumption may not be true, we are sure that many Americans could profit by an improvement in their dietary habits. The discovery of even a minor metabolic fault gives much more force to any discussion of dietary improvement.

The experience of Mosenthal[2] suggests a workable hypothesis as to the development of adult diabetes. He has shown that most individuals secrete a minimal amount of insulin at all times. He calls this their basal insulin and states that a goodly portion of this insulin is stored and utilized in the liver. When starches, fats, and protein are consumed, in other words slowly absorbed foods, this basal insulin is sufficient to confine the ingested sugars to the liver until the body in general needs them. Abrahamson has extended this finding even to foods containing such large amounts of sugar as bananas. He points out that in foods similar to bananas, the sugar is confined in pockets which must be broken down slowly during the digestive process. Thus the basal insulin is able to control relatively large amounts of sugar provided only that it is absorbed from the gut slowly.

The basal insulin, however, is able to control only very small amounts of such rapidly absorbed forms of sugar as ordinary refined sugar. Fabrikant, Abrahamson, Mosenthal and others have shown the extreme rapidity with which these refined sugars are absorbed, in some cases reaching the blood stream within five minutes. Mosenthal has shown that as little as 15 gm (three teaspoons) of refined sugar will overtax the ability of the basal insulin to confine this sugar to the liver and that the sugar will thus reach the general blood stream calling out what he terms extra-insulin. We cannot prove the point with finality at the moment, but it would seem reasonable to suspect that the adult who develops diabetes has some limitation in the amount of extra-insulin which he is able to produce. In other respects his metabolism may be entirely normal although I suspect that as we learn more of the fine points of metabolism we will discover that most diabetics have other minor defects in their metabolism pattern.

Dietary Imbalance

WE HAVE analyzed diets of several hundred people. Many of these have given us complete lists of everything they have eaten for a representative week and we have calculated the intake of various nutrients for this period of time. Obviously our people are living and working every day with their dietary intake, but there are

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very few instances in which we could not point out ways and means to improve the quality of their food intake. We have had enough individuals show clinical improvement after an improvement in their dietary intake to convince us of the value of attention. We also have done enough work to know that a general lecture on diet is virtually worthless. If we can show a person, however, that he has the beginning of a possible diabetes, he is wiling to listen attentively and is usually willing to make at least some improvement in his food selection. We are not naive enough to believe that each person will follow a perfect diet any more than a physician follows his own best knowledge as to food selection, but we do feel that many people make a very worthwhile improvement.

CASE No. 6. X.T.G. We realize that one case does not prove a point but perhaps this case will illustrate the type of control we hope for. This man is now 71 years of age, and it was discovered by urine examination in 1935 that he had mild diabetes. His wife was suffering from a rather severe diabetes, and he had helped her in arranging her diet and testing her urine. The result was that he tested his own urine frequently and stayed on essentially the same diet as she. He did not of course, attempt to weigh his food, but in general he confined himself to slowly-absorbed foods and his urine was only rarely positive. In 1951 we became curious as to what his glucose tolerance test would show. His fasting blood sugar was 110, at 30 minutes 205, at one hour 202, at two hours 153, and at three hours 128. He has some moderate hypertension and occasional slight dizziness and some rather vague symptoms, but at least he is still working at the age of 71. Had he had an entirely uncontrolled diet it seems unlikely that he would still be able to get along without insulin if, indeed, he would be able to work at all.

Diabetes and Allergy

IT IS a rather categoric conclusion of Abrahamson that diabetes and allergy are incompatible, and indeed it has been our experience that some patients with allergy who later develop diabetes have a definite amelioration of their allergic symptoms when diabetes supervenes. This improvement has not been invariable however as would be suggested by Abrahamson. We agree in general with Abrahamson's suggestions as to food selection for allergy patients but we have not had the unqualified success that his writing would lead one to expect.

CASE No. 7. T.G. is a white male now age 57. This case will illustrate the point. He developed his diabetes slowly over a period of several years and has always been able to control his blood sugar by diet alone, or with, at most, the help of a few units of insulin or small doses of Orinase. Again, this is the man who enjoys a highball before dinner. The elimination of all alcohol made a definite improvement in his subjective feelings, especially the feeling of fatigue. In spite of good control he was never able to secure the sense of well-being he thought he should have until we made a careful analysis of his symptoms. It became evident that he was feeling worse on those days when milk formed a prominent part of his diet. The elimination of milk has made it possible for him to reach the vigor normal for a man of his age.

Summary

WE HAVE presented a relatively simple method for the detection of both early diabetes and "pre-diabetes." This method consists of taking a single blood sugar specimen two hours after a meal containing not less than 50 grams of refined sugar (preferably glucose).

We have tabulated the results of testing 400 individuals who at the time of their first test had no symptoms suggestive of diabetes. By this method we discovered six individuals with mild diabetes and 17 individuals with "pre-diabetes." Further testing indicated that in none of these instances would we have been likely to discover the metabolic disturbance by either the usual urine examination or the fasting blood sugar.

We have presented case histories which illustrate the various types of metabolic disturbances which may be uncovered by this method. While some of the points we have mentioned can not be proved with finality at the moment, the cases illustrate the direction of our present thinking and the reasons for our opinions. The last case particularly illustrates the value of a considerable degree of patience and study both on the part of the physician and the patient.

We discussed some of the factors which might cause a normal person to have a high reading in this test. We also showed how the results of these tests may be used to induce an individual to improve his dietary habits.

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Toxicity of Ozone

IV. Silicone Aerosols and Alcohol Vapor Therapy in Ozone Poisoning

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AUTOPSIES of animals that died as a result of ozone poisoning showed extensive hemorrhage and a considerable amount of edematous fluids in the lungs.[1,2,3] Since death from pulmonary edema is probably due to interference with gas exchange in the alveoli, the presence of foam in the respiratory passageways may prevent the tidal air from reaching and mixing with air in the alveoli. Several recent publications[4,7] have shown that antifoams have aided in the therapy of pulmonary edema.

Luisada and colleagues[4,5] found that alcohol vapor inhalation aided clinical cases of acute pulmonary edema, while conventional therapeutic measures, i.e., oxygen under positive pressure, mercurial diuretics, morphine and other hypnotics, and venesection, did not reduce mortality associated with acute pulmonary edema.

Nickerson and Curry[6] reported excellent results with aerosols of dimethylpolysiloxanes in controlling pulmonary edema induced by intravenous injection of epinephrine in rabbits and by inhalation of chlorine in rats.

Balagot, Reyes, and Sadove[7] reported that a silicone-polhydric alcohol mixture suppressed foam in epinephrine-induced pulmonary edema in rabbits as successfully as the 95% ethyl alcohol method used by Luisada and colleagues.

An experimental program was undertaken by the author to determine the best therapy for ozone poisoning. Groups of 20 mice were exposed to ozone (made from a water-cooled corona discharge-type ozonizer) in concentrations of 10-25 ppm for three hours. The degree of ozone injury was sufficient to kill 30-60% of the animals if left untreated. Ten of the injured animals received therapy, while the other 10 were untreated. Success of the therapy was determined by comparing the death rate of the control (untreated) and treated animals. The 2 x 2 contingency table analysis[8] was used; if X^2 was greater than 3.84, there was a 95% chance that the two groups were different. This was interpreted to mean that the treated animals were protected by the therapeutic agent.

This study was supported by funds provided under Contract AF 18(600)-944 with the USAF School of Aviation Medicine, Randolph Field, Texas.

Oxygen, Oxygen-Helium, Oxygen-Alcohol Vapor

SINCE mice exposed to ozone appeared to die of asphyxiation, the use of 100% oxygen was tried as a therapeutic method. The ozone-injured mice were removed from the ozone chamber and placed immediately in a chamber containing 100% oxygen. These animals were kept in this atmosphere, for 18 hours during which time 100% oxygen was continuously supplied to the chamber. From past experience it has been observed that about 95% of animals which die from ozone poisoning succumb within 18 hours after the exposure.

Of the mice that were treated for 18 hours with 100% oxygen, 24 (31.6%) out of 76 survived. Of 71 control mice, 21 (29.6%) survived. From these results (shown in Table I) it was concluded that oxygen has no therapeutic value in the treatment of ozone poisoning.

The use of a mixture of 60% oxygen and 40% helium for 18 hours after the injury was slightly more successful but not enough to be significant. Of 86 mice, 58 (67.5%) survived when treated with oxygen-helium mixture for 18 hours. In the control group, 50 (60.7%) out of 82 mice survived (Table I). The addition of helium to the oxygen lowered the viscosity of the mixture of gases; however, this did not aid the injured animals in surviving.

Alcohol vapor was used as an antifoam in an

TABLE I.
TREATMENT OF MICE EXPOSED TO OZONE (10-25 PPM FOR THREE HOURS) WITH OXYGEN, OXYGEN-HELIUM, AND OXYGEN-ALCOHOL VAPOR

Therapy		Treated Mice		Controls		
Agent	Duration, hr	Total	Survivals, %	Total	Survivals %	X^{2*}
100% oxygen	18	76	31.6	71	29.6	0.065
60% oxygen — 40% helium	18	86	67.5	82	60.7	0.7
Oxygen — alcohol vapor	3	88	56.7	82	57.4	0.004
Oxygen — alcohol vapor	2	108	52.7	108	51.0	0.074
60% oxygen — 40% helium	18	108	52.7	108	51.0	0.074

*2 x 2 contingency table analysis.[8]

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attempt to reduce the ozone-induced edematous foam in the respiratory tract. This vapor was produced by bubbling 100% oxygen through a fritted glass disc in a wash bottle containing 50% ethyl alcohol. This oxygen-alcohol vapor mixture was then piped to the chamber containing the injured mice. The action of the oxygen-alcohol vapor mixture did not protect ozone-injured mice from death. Of the 88 mice exposed to the vapor for three hours, 50 (56.7%) mice survived, while in the control group 47 (57.4%) out of 82 mice survived. These results are shown in Table I.

A combination treatment consisting of a two-hour exposure to oxygen-alcohol vapor followed by an 18-hour exposure to a mixture of 60% oxygen and 40% helium was used. The treatment was unsuccessful. Of 108 treated mice, 57 (52.7%) of control animals survived. This difference was too small to be significant (Table I).

It can be concluded that oxygen, oxygen-helium mixtures, and oxygen-alcohol vapor mixtures do not help ozone-injured mice to survive. The foam produced in edematous lungs by ozone injury is apparently not significantly reduced by alcohol vapor. The patients who had been aided by the oxygen-alcohol vapor treatment had acute pulmonary edema as a result of hypertensive heart disease, coronary occlusion, rheumatic vascular disease, coronary heart disease, cerebrovascular and postoperative accidents, but not as a result of an irritant gas. It is possible that edema induced by a toxic gas is different or responds differently from edema resulting from the other causes mentioned above.

Silicone Aerosols

BASED on work by Nickerson and Curry,[6] experiments were conducted with silicone aerosols in oxygen as therapy for ozone poisoning. The aerosols were produced by passing oxygen at a rate of 8 liters/min into a No. 40 De Vilbiss nebulizer. Dow Corning Antifoam A and AF emulsions (dimethylpolysiloxane dispersed in glyceryl and polyoxyethylene monostearates) were used as antifoam agents.

Groups of 20 mice were exposed to ozone in concentrations of 10-25 ppm for three hours. The degree of ozone injury was sufficient to kill 25-75% of the animals if left untreated. Ten ozone-injured mice served as controls and were not treated. Immediately after exposure to ozone the other 10 mice were placed in a chamber of 40-liter volume and treated with various silicone aerosals. Single and multiple treatments were given. During the interims between aerosol treatments, the ozone-injured mice were kept in 100% oxygen. The results (summarized in Table II) indicate that silicone aerosols did not aid mice in surviving after ozone poisoning.

Pattle[9] recently reported that aerosols of silicone Dow Corning Antifoam A had no significant effect on mortality from lung edema produced in anesthetized animals by intravenous injection of adrenaline or by exposure to phosgene. Pattle[10] believes that the edematous fluid contains bubbles lined with proteinaceous material which originates from the lining of the alveolar wall and hence is resistant to antifoams.

Aerosols of Trypsin and Pancreatin

IF THE edematous foam is lined with proteinaceous material, then protein-splitting enzymes such as trypsin or pancreatin may break down the protein layer in the bubble. Hence aerosols of 10% pancreatin and 10% trypsin 4xUSP pancreatin were used. Mice were exposed to 10-25 ppm ozone for three hours. The controls again were mice injured by ozone and left untreated. Aerosol

TABLE II.
TREATMENT OF MICE EXPOSED TO OZONE (10-25 PPM FOR THREE HOURS) WITH VARIOUS SILICONE AEROSOLS

Agent	Therapy: Duration, min	Therapy: Treatments	Therapy: Interim between Treatments, min.	Treated Mice: Survived/Total	Controls: Survived/Total
10% Antifoam AF emulsion	120	1		4/9	5/9
10% Antifoam AF emulsion	120	1		3/10	3/10
10% Antifoam AF emulsion	15	6	45	1/10	3/10
10% Antifoam AF emulsion	30	5	30	0/10	4/9
1 g Antifoam A, 20 ml 100% ethyl alcohol, 30 ml amyl acetate	5	5	55	0/10	4/10
1 g Antifoam A, 20 ml 100% ethyl alcohol, 10 ml amyl acetate	15	1		4/10*	5/10
1 g Antifoam A, 50 ml 50% ethyl alcohol, 10 ml amyl acetate	60	1		1/6	4/6
10% Antifoam A in Dow Corning fluid 200 (350 centistokes)	30	4	30	4/10	5/10
10% Antifoam A in Dow Corning fluid 200 (50 centistokes)	20	5	40	3/10	9/10
10% Antifoam A in Dow Corning fluid 200 (50 centistokes)	20	5	40	6/10	8/10

* In this experiment the treated mice were kept in 100% oxygen for 18 hours instead of in the animal room.

TABLE III.
TREATMENT OF MICE EXPOSED TO OZONE (10-25 PPM FOR THREE HOURS) WITH AEROSOLS OF TRYPSIN AND PANCREATIN

Agent	Therapy: Duration, min	Therapy: Treatments	Therapy: Interim between Treatments, min.	Treated Mice: Survived/Total	Controls: Survived/Total
10% pancreatin	20	5	40	8/10	9/10
10% pancreatin	20	5	40	10/11	9/10
10% trypsin 4xUSP pancreatin	15	5	45	7/9	5/10
10% trypsin 4xUSP	15	5	45	3/10	4/9
10% trypsin 4xUSP pancreatin	15	5	45	7/10	5/9

treatment was given for 15-20 minutes every hour for five hours after the animals had been injured by ozone. In the interim 100% oxygen was given to the treated animals. Data from these experiments are presented in Table III and indicate that aerosols of pancreatin and trypsin did not protect ozone-injured animals from death.

Comment

MICE which died during the various forms of therapy were autopsied, and in the majority of cases edema and extensive hemorrhage were present. In many animals which were fatally injured with ozone, edematous fluid oozed from the nostrils. It can be questioned whether ozone-induced death can be due to edema alone, for both edema and hemorrhage occur together. If death is a result of edema in which frothy fluid prevents oxygen from reaching the alveolar surfaces, then antifoams should provide some aid if they can reduce the foam. But if death is a result of hemorrhage of lung capillaries, then antifoams cannot prevent death.

Summary

IN THE majority of the experiments reported in which induced edema was successfully treated by antifoams, the edema was produced by epinephrine. In the work by Nickerson and Curry,[6] a respiratory irritant, chlorine, was used to induce edema which responded favorably to Dow Corning Antifoam A aerosol. Pattle[9] found that Dow Corning Antifoam A had no effect upon controlling edema induced by epinephrine injection and the respiratory irritant phosgene. Punte and Owens[10] also found that Dow Corning Antifoam A aerosols and alcohol vapor had no effect on mortality following inhalations of chloropicrin or phosgene.

In the research work reported here alcohol vapor and Dow Corning Antifoam A aerosols had no influence on mortality of mice exposed to ozone. One may be led to conclude that edema produced by irritant gases does not respond to treatments used successfully for edema from other causes. Whether this failure is due to a difference between edema induced by irritant gases and edema induced by epinephrine and other causes can only be resolved by further research.

[Acknowledgment is made to Mr. Leonard Phillips for aid in obtaining experimental data.]

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Chasm

JOE BRADFORD, machine-shop supervisor, boarded the company bus at Area G. He had been swapping notes with the driver about the weather, the fishing, the local headlines. At the next pickup point Dr. Rigdon, the plant's Medical Director, swung aboard. He grunted at Joe, sat down, and buried himself in some papers. Bradford asked himself, "What's with that guy? Who does he think he is — a big wheel?" Poor "Doc" — and he liked to be called "Doc" — didn't know how Joe was reacting. He thought he ran a pretty fair show in the Medical Department, tried to give service to the employees — but when he checked his figures, he knew he was seeing only a small minority of the people at the plant. He wondered as he glanced at Joe, "Why don't any of his boys use the dispensary?" The bus aisle that separated Joe and the Doc might as well have been the Grand Canyon. Neither man had ever tried to get close to the other, to understand what his job was or what he was trying to do.

—From "The Company Doctor is Part of Your Team," by JEAN SPENCER FELTON, M.D., in *Supervisory Management*, September, 1957.

XUM

A Classification System for Lantern Slides and Other Visual Aids in Occupational Health

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ONE PROJECT at the Institute of Industrial Health at the University of Michigan is to provide and store an extensive array of lantern slides on all aspects of occupational health for use in its teaching pursuits and for loan purposes to others as requests may arise. Having on hand some hundreds of slides, films, and other visual and auditory aids, promptly it became apparent that much of this collection was unlabelled, uncatalogued, and at the time unidentifiable. This state of affairs led to a quest for a suitable classification system. It was assumed that readily such information was procurable and that a choice of several methods would be in prospect. It was found that many libraries maintain well catalogued general slide collections. Customarily these libraries utilize the same coding methods that apply to book collections, although in some medical libraries the method is based on the disease listing of the International Statistical Classification of Diseases, Injuries, and Causes of Death. Manifestly, neither was suited to the present objective. The first left off where the present need began, and the second was limited to disease and injuries.

On this account effort has been directed to the development of a simple procedure, so flexible as to encompass all aspects of occupational health and at the same time provide opportunity for unlimited extension as occasion might require. The system, already put to test through some 1000 heterogeneous slides, is now indicated:

Main Categories

A. INDUSTRIAL MEDICINE
B. INDUSTRIAL HYGIENE
C. INDUSTRIAL NURSING
D. INDUSTRIAL SAFETY
E. OCCUPATIONAL DISEASES & INDUSTRIAL TOXICOLOGY
F. OCCUPATIONAL HEALTH STATISTICS (N.O.C.)*
G. INDUSTRY IN RELATION TO HEALTH
H. ECONOMIC FACILITIES
I. LEGISLATIVE MEASURES (N.O.C.)
J. INDUSTRIAL HEALTH AGENCIES
K. COMMUNITY RELATIONSHIPS
L. INDUSTRIAL SANITATION
Z. MISCELLANEOUS

A. Industrial Medicine

A1. HISTORY
A2. ORGANIZATION & ADMINISTRATION
  A2.1 Personnel
  A2.2 Equipment & Supplies
  A2.3 Records, Forms
  A2.4 Budgets
A3. HOSPITALS & DISPENSARIES
  A3.1 Buildings, Floor Plans, Etc.
A4. PROGRAMS
A5. SYSTEMS, INCLUDING SMALL PLANTS & MOBILE SERVICES
A6. MEDICAL EXAMINATIONS
  A6.1 Preplacement
  A6.2 Periodic
  A6.3 Exit
  A6.4 Special
A7. CLINICAL (NOT E)
A8. CLINICAL LABORATORIES (NOT B)
A9. THERAPY
A10. REHABILITATION
A11. GERONTOLOGY & GERIATRICS
A12. NUTRITION
A13. STATISTICS
A14. EDUCATION
A15. SCIENTIFIC ORGANIZATIONS
A16. FOREIGN COUNTRIES
A17. TRANSPORTATION
A18. EXHIBITS, LIBRARIES, LITERATURE
A19. INDUSTRIAL DENTISTRY
A20. DIAGNOSIS & DIAGNOSTIC METHODS
A21. RESEARCH
  A21.1 Animal Experimental Work
  A21.2 Clinical
  A21.3 Field

Institute of Industrial Health, University of Michigan, University Hospital, Ann Arbor.

*N.O.C. — Not Otherwise Classified.

Code Number:	Core Numbers:	Size Slide: Film: Sound Strip:
General Subject:		
Topics:		
Source: (Book, Journal, etc.)		Date: (Period of Slide)
Source: (Name and/or Company)		Date: (Date of Gift)

Specimen Catalogue Card

A22. First Aid Measures
A23. Body Systems & Organs
A23.1 Eyes & Vision
A23.2 Ears & Hearing
A23.3 Nose & Odor Sense, etc.
A24. Surgery of Trauma
A100. Miscellaneous

B. Industrial Hygiene

B1. History
B2. Organization & administration
B3. Programs
B4. Industrial Hygiene Laboratories
B4.1 Buildings, Floor Plans, Etc.
B5. Laboratory Equipment
B6. Field Equipment
B6.1 Transportation
B7. Procedures & Techniques
B7.1 Laboratory
B7.2 Field
B8. Surveys
B9. Exposures—Chemical
B10. Exposures—Physical
B11. Exposures—Biologic
B12. Control Measures
B12.1 Ventilation & Exhaust Systems
B12.2 Process Changes
B12.3 Personal Protective Devices
B12.4 Illumination
B13. Education
B14. Scientific Organizations
B15. Foreign Countries
B16. Exhibits, Libraries, Literature
B17. Working Environment
B18. Research
B100. Miscellaneous

C. Industrial Nursing

C1. History
C2. Functions
C3. Programs
C4. Health Education
C5. Visiting Services
C6. Statistics
C7. Education
C8. Exhibits, Libraries, Literature
C9. Scientific Organizations
C10. Plant Duties
C100. Miscellaneous

D. Industrial Safety

D1. History
D2. Organizations & Administration
D2.1 Personnel
D2.2 Functions
D2.3 Records, Forms
D3. Programs
D3.1 Safety Organization
D3.2 Safety Education
D4. Accident Analysis
D5. Statistics
D6. Equipment
D7. Surveys
D8. Special Hazards
D9. Accident Costs
D10. Education
D11. Scientific Organizations
D12. Exhibits, Libraries, Literature
D100. Miscellaneous

E. Occupational Diseases & Industrial Toxicology

E1. History
E2. Classifications
E3. Major Etiologies
E3.1 Dusts
E3.1.1 Pneumoconiotic
E3.1.2 Others
E3.2 Metals

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E3.3 Gases
E3.4 Solvents
E3.5 Organic Compounds other than Solvents
E3.5.1 Pesticides
E3.5.1.1 Organic Phosphates
E3.5.1.2 Parathion
E3.6 Biological Agents
E3.7 Allergens
E3.8 Cancerogens & Cancer
E3.9 Agents acting on Skin (Dermatitis)
E3.10 Physical Agencies
E3.10.1 Radiant Energy
E3.10.2 Vibrations
E3.10.3 Noise
E3.10.4 Abnormal Pressure
E3.10.5 Abnormal Temperatures
E3.99 Other Agents
E3.99.1 Acids & Alkalies
E3.100 MISCELLANEOUS

F. Occupational Health Statistics (N.O.C.)
F1. ABSENTEEISM
F2. LABOR TURNOVER
F100. MISCELLANEOUS

G. Industry in Relation to Health
G1. HISTORY
G2. INDUSTRIES
G2.1 Manufacturing including Refining
G2.2 Mining & Other Extraction of Minerals
G2.3 Agriculture (Animal Husbandry & Forestry
G2.4 Public Utilities
G2.5 Mercantile
G2.6 Civil Service
G2.7 Professions
G2.8 Transportation
G2.9 Maritime Trades
G2.10 Military
G2.11 Clerical Occupations (N.O.C.)
G2.12 Hotels, Hospitals, Food & Allied Services
G2.13 Domestic Activities
G3. PROCESSES
G4. STRUCTURES
G5. TRADE ASSOCIATIONS
G6. LABOR UNIONS
G100. MISCELLANEOUS

H. Economic Facilities
H1. WORKMAN'S COMPENSATION & EMPLOYER'S LIABILITY
H2. INSURANCE PROGRAMS
H3. RETIREMENT PLANS
H100. MISCELLANEOUS

I. Legislative Measures (NOC)
I1. HISTORY
I2. FACTORY INSPECTION
I3. CHILD LABOR
I4. WOMEN IN INDUSTRY
I5. HOURS OF LABOR
I6. "DANGEROUS TRADES"
I7. FOREIGN COUNTRIES
I100. MISCELLANEOUS

J. Industrial Health Agencies
J1. INTERNATIONAL
J2. FEDERAL
J3. STATE
J4. LOCAL
J5. CIVIC
J6. PRIVATE & UNOFFICIAL
J7. HOSPITALS
J8. FOUNDATIONS & INSTITUTES
J100. MISCELLANEOUS

K. Community Relationships
K1. AIR POLLUTION
K2. NOISE
K3. ODORS
K4. WATER POLLUTION
K5. RADIOACTIVE MATERIALS
K6. INDUSTRIAL WASTES
K100. MISCELLANEOUS

L. Industrial Sanitation
L1. TOILET & LAVATORY FACILITIES
L2. LOCKER ROOMS
L3. CAFETERIA & LUNCHROOMS
L4. DRINKING WATER FACILITIES
L5. JANITORIAL SERVICES & HOUSEKEEPING
L100. MISCELLANEOUS

Z. Miscellaneous (N.O.C.)
Z1. FATIGUE

IN THIS presentation, by design some subdivisions have been removed to save space. A few others have been included in part to serve as examples of possible unlimited extension. Thus, A23 could be continued to include every system and organ. Likewise, B12, as well as D6, might be continued through many other items. E3.1 and E3.5 serve as examples of the unlimited opportunity for subdivision.

It became apparent that cross listing was an essence, and that the slide catalogue information was more important than descriptive data on the slide level. The slide need bear only identifying numbers. The card catalogue furnishes necessary description. For example, let it be assumed an unlabelled, unclassified slide is in hand depicting an x-ray exposure room with extensive Roentgen equipment, a worker undergoing chest filming and a nurse-technician performing the task. Such a slide was classified under "Physical Examinations" as A6, but was crossed listed with "Nursing Functions" as C2,

"Nursing Education" as C7, "Dispensary Equipment and Supplies" as A2.2, and, since potential radiation injury is involved, under "Radiant Energy" as E3.10.1. Although all slide cards dealing, for example, with "Industrial Nursing Functions" would be assembled in one catalogue list, the actual slides might be stored vicariously. Thus any physician, hygienist, nurse, or hospital administrator may be able to locate suitable slides on many topics, but a single slide might be utilized in a half dozen diverse lectures.

It is known that many industrial Medical Departments, teaching centers, official agencies, etc., possess hundreds of slides, often kept on a helter-skelter basis, in numerous small slide boxes, and with some breakage inevitable. Some gain may be made until a superior method of classification is devised if this suggested classification be accorded some acceptance. This will facilitate multiple usage of the same slides and the exchange of slides on a loan basis. The hope is that the major lettering and numbering may become standard. The ultimate subdivisions need not be standardized. Yet flexibility possibilities provide extensions on an individual need basis.

While the method of storing large collections of slides is not crucial to the system here mentioned, it is noted that convenience, visibility and space conservation are served by Multiplex Slide Cabinet No. 40, Multiplex Display Fixture Company, 910-920 North Tenth Street, St. Louis 1, Missouri. This unit will house 26 frames or 750 4"x¼" slides, or 26 frames or 2340 2"x2" slides.

AT THE OUTSET of this paper it was noted that the Institute mentioned is building up a major collection of lantern slides and other aids. All slides and catalogue cards are duplicated to facilitate loans to others. It is surmised that in scores of industrial medical and hygienic establishments, lantern slides and films may have served their purpose and no longer are wanted and in fact may be burdensome. Without any connection with the prime purpose of this presentation, it is noted that this Institute will welcome all contributions of visual aid materials so long as they relate to occupational health in any of its aspects and are well identified and described. At all times such items readily will be available to the donor as well as to others. All gifts will be credited to the donor as the source. The hope is that in brief time this collection substantially may be complete as to scores of topics related to the health of industrial workers. The footnote on the first page provides a suitable address for correspondence with the Institute.

SUMMARY: A system for classifying and cataloguing lantern slides and other visual aids for occupational health has been described.

Worth Repeating

SICKNESS" and "health" are relative terms. Health is never absolute, nor is sickness absolute, except possibly in death. Health might be defined briefly, not in anatomical or physiological terms, but simply as the optional adjustment of the individual to his physical, social, and spiritual environment. Many, if not most, such maladjustments manifest themselves in physical complaints: headaches, dyspepsia, diarrhea, dysmenorrhea, myalgias, backaches, etc. To be sure, these complaints may have an underlying anatomical or physiological derangement, but even such derangements may be the long-term, ultimate result of maladjustments to family, fellow workers, and society at large. If we are truly to practice preventive medicine or even curative medicine in many instances, we must approach environmental factors rather than prescribe drugs which often serve merely to decrease the awareness of the individual of his environment or his own physical discomfort. But, who is to manipulate these environmental factors? If sickness absenteeism is to remain a problem for the Medical Department alone, and if the Medical Department is pledged to respect the employee's confidence, one can only do a palliative job. Our observations have led us to conclude that repeated and chronic short-term "sickness" absenteeism falls into such a functional category of disease in most instances. It is not correctible by the implementation of orthodox medical measures. The problem requires the concerted efforts of a team. The doctor must, of course, be a member of this team, but his role may be no more important than that of a number of other members of that team.

—From "The Short-Term Absentee from the Point of View of the Physician in Industry," by L. J. WADE, M.D., Medical Director, Esso Standard Oil Company in *The Medical Bulletin*, March, 1955.

XUM

The First Annual
Western Occupational Health Conference

OCTOBER 4-6, 1957
LOS ANGELES

THE FIRST Annual Western Occupational Health Conference was held at the Biltmore Hotel, Los Angeles, October 4, 5, and 6, 1957, under the sponsorship of the Western Industrial Medical Association, and coincident with its Sixteenth Annual Meeting. Participating organizations included Western Industrial Nurses Association, American Industrial Hygiene Association, American Conference of Governmental Industrial Hygienists, and allied safety groups of South and North California.

During the decade and a half prior to 1957, the Western Industrial Medical Association conducted annual programs, with courtesy invitations to members of the other groups concerned in the protection and improvement of employee health. These were designed to furnish a meeting ground for those whose interests had this common aim. But with the tremendous growth of industry and population west of the Rockies during recent years, there has been an increasing need for a combined conference in which the participating groups would be principals rather than guests — particularly since so few of the western members of the organizations comprising the National Industrial Health Conferences have had the opportunity to go East to attend them. This First Western Conference, designed to fill this need, was something of an experiment. It proved highly successful. The attendance exceeded expectations — there were near to 550 registrants; the several dozen commercial exhibits were the subjects of continuous attention; the audience interest was sustained throughout the various sessions; the program — carefully planned and capably conducted — was fully responsive to the time and the opportunity. All in all, the promise implicit in naming this Conference "First Annual" was more than fulfilled; it was the beginning of an assured succession — the "Second Annual" Western Conference, in 1958, will be held in San Francisco.

The General Conference Committee included Douglas D. McKinnon, M.D. *(Times Mirror)*, Chairman; Edward J. Zaik, M.D. (Pacific Telephone and Telegraph Company), Secretary;; C. L. Lloyd, M.D. (North American Aviation Company), Treasurer. Homer S. Elmquist, M.D., was Chairman of the Arrangements Committee and the Exhibits Committee; Clarence L. Lloyd, M.D., of the Entertainment Committee; Douglas D. McKinnon, M.D., of the Planning Committee; Fred Bryan, M.D. (Division of Industrial Medicine, School of Medicine, University of California), of the Program Committee; A. C. Remington, M.D. (Garrett Corporation), of the Publicity Committee; C. H. McCallister, M.D., of the Registration Committee.

Program participation featured the "teamwork approach"; management, medicine, nursing, safety, hygiene, engineering, public health, all were represented in the discussion panels. Each session closed with a "Question Period." Following are some highlights of the presentations:

Human Factors Engineering

ON THE Friday morning (October 4) subject, "Human Factors Engineering," Session Moderator Craig L. Taylor, Ph.D., University of California at Los Angeles, said, in part: "The human factors group works close to the design stage of engineering development. Design for safety and for effective human use is planned from the earliest inception of the enterprise. By the application of biotechnical principles at this stage many of the hazards which plague the health practitioners at later stages can be avoided. Many modern engineering developments create potential hazards — for example, the 300-hp motor car and the nuclear reactor are not inherently healthy devices — so that coordinate planning for health and safety is an essential counterpart to such technical development. Again, the application of formulated and experimental bioscience, and the biotechnology which interrelates it to the engineering system, are prominent features of the work of the human factors group. Psychologists, physiologists, anthropologists and others are bringing to bear the basic knowledge of their fields for the solution of problems of man-environment and man-machine interactions. As a result of this, human data are being formulated, tabulated, and made available in handbook, journal, literature, and textbook form for use by the practitioner. A high degree of teamwork is demanded in human factors activity. Just as the airplane is the joint enterprise of the structural, aerodynamic, propulsion, mechanical, and electrical engineer, the cockpit, as an optimal living space and an effective task performance station for the air crew member, is the responsibility of the physiologist, the psychologist, and the engineer. No one specialist has all of the answers, but the combined heads of all provide the solution. Our program today includes a medical man, an engineer, a physiologist, and a psychologist. They are here to tell you what they do, how they fit in with the other scientific and technical specialties, and what their aims and aspirations are. While they are

imarily aircraft industry people, there is much their experience that is common to all industry nd engineering work."

C. M. Whitlock, Jr., M.D., Physician in Charge f Aviation, Space, and Radiation Medicine, Convair, San Diego, told of Convair's Research and Development program in the biologic sciences, using selected material from thermal stress studies, altitude studies, radiation biology studies, and "g" tolerance studies. He said that "man right now could fly at the speed of light — 187,000 miles a second. The problem is getting him accelerated to that speed; the limitation on the speed at which man can fly is acceleration, or the time-rate of change. If a man flew to Mars at the speed of light, he would have to spend one year accelerating up to that speed. Then he would have to spend a year decelerating before he could land. When it becomes necessary for manned aircraft to fly at these speeds, a way for suspending the pilots either in water or light oil in order to withstand the added pressures will have to be devised. Experiments in the field are going on now. Liquid suspension at best would provide only a temporary solution. As man's flying speed continues to climb, some way of injecting oxygen directly into the blood stream may be necessary to enable the human body to withstand the added pressures. The fact that the individual has air in his body is a limitation on how much he can sustain tolerance to acceleration in a liquid medium. According to Dr. Whitlock, the day of space travel is not far off. In the not-too-distant future we expect to see manned rockets and not too far after that we expect to see passenger rockets."

Other speakers on this subject were John H. Lyman, Ph.D., Assistant Professor, Engineering, University of California at Los Angeles; J. G. Wells, Ph.D., Supervisor, Human Engineering Analysis, Northrop Aircraft, Inc.; and John H. Mathewson, M.S., Professor, Engineering, Assistant Director, Institute of Transportation and Traffic Engineering, University of California at Los Angeles.

Dermatological Problems

THE EARLY afternoon subject on Friday, October 4, was "Dermatological Problems in Industry." The panel discussion emphasized that nonoccupational as well as occupational dermatitis must be of concern because of factors of aggravation, problems in diagnosis, and liability. Nonoccupational dermatitis was considered in relation to preplacement examination and relative to problems involving workers on the job. Certain misconceptions regarding some aspects of occupational dermatitis were pointed out, and reference was made to a few improper attitudes and practices. The safety engineer's viewpoint drew attention to incidence and costs. This was followed by a discussion of various control measures, substitution, protective clothing, creams, cleanliness, etc. Mention was made of the labeling requirements for injurious substances in the general Industry Safety Orders, and the educational efforts of the Division of Industrial Safety in distributing brochures dealing with various occupational health hazards. As to the industrial nurse, Mrs. Kirk Deutsch, R.N., Medical Department, Douglas Aircraft, said: "Having been associated with Douglas Aircraft since 1939, I have seen a lot of dermatitis, and in almost every case — 'Well, I didn't have it before I worked here.' Sometimes the employee had been on the job five to 10 years; other times, two days to two weeks. It is the industrial nurse's duty to take a complete history from every employee who presents himself with a dermatological problem. She must observe: type of rash, part of body affected, date of onset, general appearance, health, cleanliness, complexion (dark-complexioned people seem to have less reaction to plastics), state of nerves, general attitude. Has he been exposed to, or been using, anything different from the usual? Has he been on a vacation? Eating any differently? Using detergents at home: Does he have this rash or condition on any other part of his body? After this history is complete, he is referred to the plant physician for diagnosis and treatment. If he is a new employee, perhaps he has never worked with metals, cutting oils, paints, plastics, the epoxys, etc. In this instance, he will be given a mild ointment or lotion to use at home, and a protective cream to use at work, and he will be taught preventive measures. If the doctor feels the condition is caused by some material the employee is working with, he is restricted for two weeks from coming in contact with it. If at the end of the two weeks, the condition is cleared, the problem is solved, and the employee will not be allowed to work with that particular substance or material again. If on the other hand, he has not cleared, he will be sent to a dermatological consultant, who decides whether the condition is occupational. If occupational, the employee usually remains under his care until cured. In many instances, even though the dermatologist has diagnosed the case as non-industrial, the patient is not in agreement and still feels his condition is caused from something at work. These are the litigation cases. This is where the history taken by the nurse upon the patient's first visit to the dispensary becomes so important. This first report will usually have the facts. The nurse does not diagnose. She does not treat. She takes a clear, concise history. She carries out the doctor's orders. She sees that the patient knows how to use, and does use, the protective ointments and lotions provided by the dispensary. She tries to allay the employee's apprehensions. She gives him confidence in the plant physician. She acquaints him with safety and hygiene. She instructs him as to follow-up home care in many instances. If conditions are such as to cause neurological dermatoses, she should know the proper agencies to which he can apply for aid or relief. I can approach this subject only from the viewpoint of an industrial nurse in a large industry. The industrial nurse in small industry, working alone, with no doctor on the premises, cannot refer every patient who comes to her complaining of a light rash or a small pimple to the on-call company doctor. She would have to have standing orders to cover these situations. This nurse has an entirely different approach to dermatological problems."

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Hazards — Hidden and Otherwise

THE Friday program closed with a panel on "Hazards — Hidden and Otherwise." Fred Ingram, Chief Industrial Hygiene Engineer, Division of Occupational Health, University of California, Berkeley, summarized the discussion: "Occupational diseases are injuries to the person, not as spectacular as accidents, and hence less impressive. For this reason and others, occupational diseases and their causes are often unrecognized or ignored. The question was raised as to where, how and when an exposure occurs, when an exposure is a hazard, and what should be done about it? Examples were given. Emphasis was placed on the need to evaluate the type of material, the concentration of the contaminant, the length of exposure, whether more than one material was involved, and the mode of action on the body. Standardization of control measures for given types of operations was suggested on the basis that when past experiences have shown the operations to be productive of dangerous conditions, it is not necessary to prove the particular situation. Reference was made to the standards of the American Standards Association, the National Safety Council, etc. It was emphasized that advance study of an industrial operation, together with its physical relationship to building location, and planning for adequate control, even to process change if indicated, will be effective and economical in the long run. The interrelationship between exposure to potentially toxic compounds in the plant and in the home was discussed, with citations to typical situations. A point was noted concerning the part played by home exposures in the development of possible toxicities which result in compensation cases. An attempt was made to relate outside psychological maladjustments of poor-risk employees. The influence of hobbies on the development of such conditions as skin allergies was discussed; and it was pointed out that good industrial hygiene is a 24-hour program.

Hiring the Handicapped

ON SATURDAY morning (October 5), the discussion subject was "Hiring the Handicapped Without Handicapping Industry." H. L. Herschenson, M.D., Medical Director, Douglas Aircraft, was Moderator. Opening the meeting, he said, in part: "Our laws, courts, and industrial accident commissions should help our handicapped to obtain jobs. Favoring an isolated case may result in a company policy prohibiting the hiring of all handicapped persons who have the same disability as the person who wins a large award for an accident which was in no way the fault of the employer."

Justin P. Johnson, Special Project Representative, Public Relatoins Department, Hughes Aircraft Company, speaking from the standpoint of management, said, in part: "If the applicant has acceptable personality characteristics, a useable potential or skill; if the employment interviewer does not attempt to be a medical man, or *vice versa;* if placement is done intelligently, with the knowledge of the safety department and supervision, there is no need for further concern. I believe if we spent a little more time, energy, and money on maintaining a professional and dynamic safety program we would be screaming less about subsequent injury clauses, bad commission rulings, and high insurance rates. There is ample proof that all this works successfully. . . . Several years ago the Los Angeles Chamber of Commerce held an all-day conference on the subject of employing the physically handicapped. A friend, the vice president of a plumbing manufacturing company, called me and said he was to speak on amputees. He asked 'What can I talk about for 50 minutes on amputees? I can sum it up in one sentence. They're no different from anyone else if there's a proper job opening.' I was interested in what his approach would be. His turn came after the coffee break, and as we sat down we noticed a shiny chrome shower nozzle on the tables in front of each chair. My friend spoke of their special design, their utility and sturdiness of construction, and said we could keep them. Then he asked us to disassemble the contrivance, and we ended up with five components. We then were told to put it together, which we all did quite commendably. Again we took it apart — and did it with one hand, then the other. We were then asked to blindfold ourselves and assemble the nozzle — again with one hand, still blindfolded. We all wound up this operation in considerably less than the 30 seconds allotted in the assembly by normal persons. He then said, 'I now give you an operation that can be performed successfully by a double-leg amputee, a paralytic, a one-armed amputee, a sightless person, a deaf and speechless person, a cardiac, diabetic, etc., and there are thousands of similar jobs. Any questions?"

Mr. Johnson then showed a series of slides, which he described as follows:

1. Girl paraplegic — accident at age 15 — example of employee morale — fellow employees chipped in 75 cents a week and presented her a new chair on her birthday. This happened to five different wheel chair cases — even two secondhand cars.

2. Good example of job dilution — paraplegic and totally blind on missile launcher assembly. Paraplegic does precision drilling and blind does the assembly. Incidentally, this paraplegic is now standing most of the time and walks with canes. Six examples of this out of around 250 we've hired since 1948.

3. Paraplegic graduate of Bulova Watch School, where they've turned out some excellent job candidates. Worked up from assembler to instrument technician. About to get engineer classification.

4. One-leg amputee — shot down over Germany in 1944. Pitched baseball for the Washington Senators in 1945 and 46. In pro ball until two years ago. Turned down by over 150 companies — been one year in Employee Services and recently promoted to Planning Engineers. Very valued — 150 employers missed a swell bet.

5. Blind doing terminal board assembly — 68 operations, 28 parts, and use of eight hand tools. Outproduces because of no distraction. In fact, one of these worked himself out of a job. Incidentally, we can invariably eliminate minor inspections prior to assembly because these people reject faulty parts by feel as soon as they pick them up.

6. One-armed comptometer operator — our fastest. Also have three one-armed typists. This girl just raised to an accountant classification.

7. Post-polio in chair — flail left arm. Industrious and cheerful — took technician course on the side and now a full-fledged test technician in three years. One of the rare cases not exposed to any formal rehabilitation program. Studied watchmaking under uncle, and just a well-motivated individual to start with.

8. Cerebral palsy victim — about as bad as they come. Wonderful disposition. We worried about acceptance at first and had him in sheltered area. Placed him in assembly area with large group of women, and acceptance terrific. First birthday had the biggest party ever given anyone. Excellent wire stripper — now working with an electric frayer. Amazing — have 12 like this.

9. Until a year ago, this 51 year old woman in wheel chair had been dependent on the state and her family for support. Wandered into a Long Beach workshop and proved so adept at wire harness work on one of our subcontracts that a supervisor visiting there hired her. Now has her own apartment, and is taking driving lessons. Completely self-sufficient, and a new woman.

10. Paraplegic and single-leg amputee — perhaps only heliarc welder in the country in a chair. Uses hand throttle instead of conventional foot feed. Proved so effective other welders have adopted it. Trained by us.

11. An amazing blind chap — works in temperature-controlled, dust-free room, the work is so intricate. Does inspection and critical assemblies.

12. My prize gal — bookkeeping machine operator in Credit Union. Outfit was balled up last April so they had Mary Jane come in alone on the swing shift for a week and she straightened it all out. Lost husband while she was hospitalized, and has youngster. Wonderful disposition and best worker we've ever seen.

13. A computer engineer of ours who was stricken with bulbar polio two years ago. While still in a respirator we put him on off-premise salary, gave him a dictaphone, and sent him problems to work. Came back to us in April for four hours a day, and is now working eight. Totally immobile except for slight wiggle of the feet. Had to develop frog breathing, and still sleeps in respirator at night. A good example of utilization of man power and mind power.

Lester Breslow, M.D., Chief, Bureau of Chronic Diseases, State Department of Public Health, submitted comments on medical aspects of the problem of heart disease and employment abstracted as follows: Substantial numbers of people employed in industry have heart disease. The rapid increase in arteriosclerotic and hypertensive heart disease in middle age and beyond affects a large segment of the working force in the age groups 40 to 65. In 1953, of 312,000 disability insurance claims filed with the State Department of Employment, 7.4% in men and 2.6% in women were for heart disease. These claims cost $6,000,000, representing 10% of basic benefits paid in that year. A comprehensive medical examination given to a random sample of 2,252 Los Angeles city employees resulted in diagnosis of heart disease in 7.7%. Only one-third were aware of the existence of the disease. The relationships of work and cumulative stresses to the causation of heart disease are not known. Direct injury to the body may cause hemorrhage, and contusions and lacerations of the heart or great vessels; and excessive exertion may overtax a diseased heart. Until more factual information becomes available physicians will continue to offer contradictory testimony before boards adjudicating heart disease claims wherein work is an alleged causative factor. Considerable evidence has accumulated to show that cardiacs in industry work effectively with good safety records and minor absenteeism, particularly when adequate rehabilitation has been accomplished. Many reasons for failure to employ cardiacs are offered. These pertain to motivation, compensation and pensions, fitness for a job, age, seniority, impact of workman's compensation laws, employment policies, etc. The problems involve the legal profession, courts, unions, industry, and medicine. Medical aspects include the value of screening examinations, rehabilitation, and work classification units. The medical profession has a large measure of responsibility for adequate rehabilitation of the cardiac. Estimates indicate that a half million adults in the United States yearly face the necessity of adjusting to work after heart attacks.

Leonard J. Yamshon, M.D., Los Angeles, presented a paper on "The Problem of the Aging Workman." Following is an extract: "If the man is properly placed for the job in many instances he will require no special working situation or training. Some will require a modification of the job or perhaps a modification of the equipment. Some will require working a shorter work day, and some will require a change of type of employment. The question arises: Why should the employer make all the concessions? The truth is, he should not. The man must make certain concessions — perhaps shorter hours with less take-home pay. It is physically impossible to speed up an old man to a young man's pace. On the other hand, it is both ridiculous and economically unsound to slow a young man down to the pace of the older man. It is one thing to get the benefits of a shorter work week or of vacation pay in an industry and another thing to compel a young man to work a shorter week only because that is the amount of time an older man is physically capable of working. It would be better to concede to a shorter work day for older employees. The unions, as the working man's representative, will also have to make fundamental concessions, such as a shorter work week for the older man, allowing the crossing of rigid trade lines, waiving certain seniority rules, or possibly even a separate wage scale to make it possible for employers to utilize these people effectively, efficiently, and economically."

Lee B. Johnson, Chief Safety Engineer, Northrop Aircraft, closed his presentation with the following summary: "Assisting the handicapped employed in industry to prevent accidents is no problem. Safety engineering experiences have demonstrated that the employment of physically handicapped in industry

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Seated (left to right): Raffaele Sether, R.N.; Ethna Paul, R.N.; Clyde C. Greene, Jr., M.D., General Medical Director, Pacific Telephone and Telegraph Company (San Francisco); Mary Frederick, R.N.; and Helen Rarick, R.N. Standing (left to right): Esther Ostrom, R.N.; Maxine Gage, R.N., Medical Office Supervisor, Pacific Telephone and Telegraph Company (Los Angeles); Edward J. Zaik, M.D., Assistant Medical Officer, Pacific Telephone and Telegraph Company (Los Angeles); Azilda Cole, R.N.; Emily Saterdahl, R.N.; H. Voorhees, R.N.

does not call for any special engineering treatment, other than that provided for the unimpaired person. In fact, the accident prevention survey made by the U.S. Department of Labor on Impaired Workers employed at the Northrop Aircraft Company during the years 1944 through 1947 disclosed that during this period the impaired workers turned in a record of performance equal to, and in some respects substantially better than, the unimpaired workers matched against them. Past experience by industry in the employment of handicapped has not handicapped industry. To the contrary, the handicapped have been good employment risks. The safety engineers have found less erratic unsafe behaviour among handicaps than among the unimpaired workers. It is the engineers' recommendation that greater consideration be given to the control of the erratic behavior of some of the unimpaired persons when establishing safety factors. Through better engineering systems, industry medical services, and management, we must continue to stem the tide which creates physically handicapped persons."

Radiation in Industry

BIRCHARD M. BRUNDAGE, M.D., Medical Department, North American Aviation Company, was Moderator of this Saturday afternoon session. The discussions yielded the following abstract: Atomic energy is no longer used for the sole purpose of producing bombs. Besides its usage in the medical field, there are many others in industry, particularly various industrial uses in chemical testing, process control, thickness gauges, and wear tests of automobiles and floor waxes. Recent advances in the petroleum industry and in metallurgy, using radioactive substances (radioisotopes), are in progress. Experimentally radioisotopes are being used in the food and drug industries. Sterilization of drugs and the preservation of foods, without destruction of the value of the product, are the ultimate goals. Heat, from nuclear power plants, in the form of process steam, may develop into considerable importance for industries in which a readily controlled heat source is necessary. It has been estimated that radioisotopes will be saving U.S. industry and agriculture about five billion dollars annually within three to five years. Emphasis is being placed upon development of economical and safe nuclear power reactors. It is well known that radiation can be significantly hazardous. Control of this hazard is expensive in both money and manpower. This control must not be short-circuited or ignored but, at the same time, it must not be so rigid as to stifle legitimate use and development. Emphasis is placed upon the need for adequate training, and supervision if radiation is used is recommended. Education of the entire public in this field is vital.

At the Banquet, Saturday evening, Mrs. Spencer Tracy, speaking on "The Young Deaf Child and His Education," described the work of the John Tracy Clinic, named for her son, and established as an educational institute for preschool deaf and hard-of-hearing children and their parents. The Clinic, through its correspondence courses, has taught parents in 52 countries. Dr. Douglas D. McKinnon, Conference Chairman, presented to Mrs. Tracy, a check from the Western Industrial Medical Association, for use in the work of the Clinic.

Industrial Medical Association

President's Page

LAST MONTH it was said here that the reports of some of our IMA Committees represent "the continuing work of years." That is particularly true of the History Committee — *its* history goes back to 1942; it had its genesis in the revelation, at the Annual Meeting of that year, that no record could be found of the names of those who attended the first meeting of the newly-organized American Association of Industrial Physicians and Surgeons at Detroit in April, 1916, and that, even on the four-foot enlargement of the panel photograph of the 125 who were then and there present, only about a dozen could be identified.

This disclosure brought into sharp apposition the two philosophical views: (1) that "the only good histories are those written by the persons themselves who commanded in the affairs whereof they write," and (2) that "the meaning of history is never apparent to those who make it."

It had been 25 years since that first meeting at Detroit, and the prophecy voiced at the time that the new association was destined to become "the giant of industrial medicine in the United States" had survived as a reality rather than an echo. The giant was beginning to be aware of its stature, and soon would come the day when it would give much indeed, for the records of its early years. If the work were begun immediately, it might be possible to assemble those records. Some of the pioneers who had commanded in this giant's youthful affairs were still at hand; some of those who had made its history up to then could throw light upon its meanings. . . .

Such was the tenor of the spreading thought. Dr. Loyal A. Shoudy became its spokesman. A Committee on History was appointed. Dr. Shoudy was its Chairman; Drs. Otto P. Geier and Frank Rector its other members. Then started the long search for records, the patient taxing of memories. Little by little the years began to live again; the pattern of events began to emerge. In October, 1943, Dr. C. F. N. Schram and Dr. A. H. Whittaker were appointed to the Committee; and four years later, in 1947, Dr. Whittaker became its Chairman. Each year since has seen him reappointed, and his continued and persistent efforts have at last brought about the completion of the definitive History of the Industrial Medical Association.

THIS HISTORY is not a chronology; not a mere listing of happenings, and names, and dates. It is a narrative — the story of a vast and meaningful movement — pulsing, living — fresh as news — interesting as a best seller — the story of occupational medicine in America.

With a significance that makes articulate the spirit that lives in career dedication to industrial medicine, the History is named "Thy Brother's Keeper."

The manuscript — nearly a thousand typed sheets — has gone to the linotypers. It is planned that, by the time of the Atlantic City Conference in April, they will have been made into the 600 printed pages of the *de luxe* Limited Edition in which the book will be published. The copies will be named and numbered in the order of their subscription. Dr. Whittaker, himself a bibliophile, and the possessor of many almost-priceless first editions, is not alone in the belief that this first edition of "Thy Brother's Keeper," is destined rather soon to become, all on its own, a highly-prized and somewhat expensive "collector's item."

THIS message, however, is not intended as a book review. It is meant to be circumstantial in connection with last month's comments on the fine work of our IMA Committees — to praise in specific rather than general terms. It is interesting to be attempting such praise while fully confident that the quality of the successive Committee reports, as they come along, will prove it wholly unnecessary. . . .

Jerome W. Shilling M.D.

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Letters

World Meeting

TO THE EDITOR: The World Congress of Doctors for the Study of Present-Day Living Conditions held its Second International Conference on the Influence of Living and Working Conditions on Health, September 27-29, 1957 in Cannes, France. One of the most noteworthy features during the three day conference was the fact that over 300 doctors from 41 countries exchanged views on the themes of Nutrition and the Incidence of Disease, the Effects of Working on Physical and Mental Health and the Need of Modernizing our Workmen's Compensation Laws.

To quote Professor Crew: "As yet medicine, in respect of its organization, interest and techniques, is not sufficiently prepared to play its full part in these enterprises in social amelioration and human betterment. Its development as a social science is not yet sufficiently advanced." It was with such a background that in Rome in 1941 a preparatory conference of doctors from many countries discussed the possibility of an international exchange of facts and opinions on the effects of living and working conditions. As a result of this preparatory conference, the World Conference of Doctors for the Study of Present-Day Living and Working Conditions on Health was established; and, an international conference attended by doctors from five continents and representing 30 countries was held in Vienna in 1953.

In his speech opening this year's Congress, Professor J. de Castro, former president of the Food and Agriculture Organization, U.N., and Director of Institute of Nutrition of Brazil, summarized the actual known facts on the relationship between various types of diet and health levels, including the consanguinity of diet and malignant tumors and the dangers of radioactivity through an alimentary change. He also emphasized the need of a free and permanent exchange of ideas of men of science and of therapeutic methods on behalf of health maintenance.

All scientific papers and executive sessions were conducted in the ample conference room of the Martinez Hotel. More than 12 different languages were spoken by the delegates; the official languages of the conference were English, French, German, Spanish and Russian.

While all the scientific papers were discussed, those attracting most attention were presented by the Japanese and German delegates on the Late Effects of Ionizing Radiation on Health. Also between the Russian and the Puerto Rican (US) delegates, on their concepts of modernizing Workmen's Compensation Laws, and the present and future outlook.

The following physicians were elected as officers of the Executive Council of the Congress:

President: Professor Jose de Castro, Brazil; Secretary General: Dr. F. Scholl, Austria.

Members: A. R. Balgia, India; Dr. Luis E. Ramos-Yordan, United States-Puerto Rico; Prof. Ehore Biocca, Italy; Dr. H. Descomps, France; Dr. F. Gietzelt, Germany; Dr. F. Lazard, France; Prof. Josef Lukas, Czechoslovakia; Dr. L. Norman, England; Prof. Pai Hsi Ching, China; Prof. J. Parisat, France; Prof. G. Teruoka, Japan.

—DR. LUIS E. RAMOS-YORDAN.

The Ontario Plan

TO THE EDITOR: The Ontario Workmen's Compensation Plan has received much well-deserved medical and legal attention and praise for its method of handling workmen's compensation problems.

Several weeks ago I enjoyed a delightful visit at Toronto, with Dr. Steele and his associates. I will not enlarge on our compensation discussions, as the Ontario system is not applicable in our political framework. Also I realize that most industrial physicians are conversant with the Ontario Plan. But a description of the Rehabilitation Center at Malton, a suburb 25 miles from Toronto, may be of more than passing interest.

Presidential Table: Left to right — Professor S. A. Sarkissor, USSR; Professor J. Parisot, France; Professor H. Descomps, France; Dr. Luis E. Ramos-Yordan, Puerto Rico, USA; Professor J. Dvorjetski, Israel; and Professor J. deCastros, Brazil, addressing the Congress.

The Center comprises many small units spread over a large area adjacent to an active airport, giving the appearance of the familiar army barracks. At the Administration Building I met Dr. Young, who is in charge of the Center, and his capable administrator, Mr. Morrow, and we had a most interesting chat concerning their efficient methods of handling 14,000 patient days a month, involving an estimated monthly cost of operation of $120,000. They have a total of 11 physicians, two psychologists, 19 registered nurses, four nursing assistants, ward aids, remedial gymnasts, 21 physiotherapists, handicraft workers, a recreational officer, and orderlies. The staff totals 225. Last year they had 1,483 hospital admissions, and 2,239 clinic patients, including readmissions.

ighty percent of their discharged patients were available for employment. The average length of stay was 42.97 days; 9.04% of the cases were "spinal sprains"; 8.91%, lacerations; 5.34%, intervertebral discs; 6.28%, fractured tibia and fibula; 5.48%, tarsal bone injuries. The monthly per diem breakdown was interesting: 1.02 ($15,000.00) went for administration; 2.17 ($31,000.00) for treatment; 0.76 ($11,000.00) for maintenance, and 1.35 ($20,000.00) for meal cost.

Having been Chief of Surgery in the army during World War II, when inspections were the daily routine, I fell into the formula almost without realizing it. There was an unmistakable air of efficiency, cheerfulness, and staff cooperation; the physiotherapists were most active and thorough; and the patients all seemed to be imbued with the spirit of teamwork, competitive progress, and a desire to overcome their individual handicaps. They seemed proud of their setup.

The converted barracks were kept up largely by the patients themselves; the beds were neatly made; the barracks were policed with almost military exactness. Yet one did not get the feeling of regimentation. Rather there was an air of acceptance of the necessity for such order to accomplish their only reason for being there — rehabilitation. An interesting feature — bringing home the careful planning behind the program — was the specialized attempts to get the man back into his own field. There were miniature tracks for railroad laborers, and a freight car (donated by the railroad union) with rungs to climb; a miniature mine pit; large logs to chop for the rehabilitating logger, etc. Many innovations being used were the results of ideas of former patients. A full-time employee, who was working on a most ingenious machine, has the job of keeping the hundreds of various contraptions in working order. Dr. Young told me that each case periodically is evaluated as to progress, and the patient's doctor is consulted as to the man's personal problems, in addition to his injury.

An active Public Service Department under Mr. Kerr, engages in frequent trips about the province, and both Mr. Kerr and Dr. Young know nearly all the provincial physicians, their capabilities, and their rehabilitation problems. I will not mention the actual mechanics of admission and follow-up of "graduates," as that part of the Center's activities ties in closely with the Compensation Plan *per se*.

Next spring a new, modern Center will be opened. It will be a model Center. I believe, however, that the personnel will miss the old quarters, very much as we missed our tent life in the army. The proximity to the adjoining air field, and the old buildings (designed originally for three- to five-year maintenance), make such a move imperative. They told me of looking out the window one sunshiny afternoon, and rubbing their eyes at what they saw: two wheel-chair invalids were having a race down one of the active airstrips of the flying field. Needless to say, they were immediately "captured."

My visit emphasized for me the tremendous advantages of having rehabilitating patients under 24-hour continuous care. As in the army, a large in-patient setup provides the challenge of competition — the incentive to stop pitying one's self, but instead to imitate Joe, who was much worse off and now is ready for discharge.

Congratulations to Dr. Steele, Dr. Young, Mr. Morrow, and the entire staff of the Ontario Rehabilitation Center. — N. GILLMOR LONG, M.D.

20 North Wacker Drive, Chicago 6.

[*Editor's Note:* Dr. Long is Chief Surgeon for Lumbermens Mutual Casualty and American Motorists Companies. He is a member of the committee on Workmen's Compensation of the Industrial Medical Association.]

The 1960 International Congress

TO THE EDITOR: When we pause to think of the birth and the growth of our specialty of occupational medicine, we can't help but appreciate our indebtedness to those in distant lands — in former times and present ones — who first recognized the need and the opportunities to which we devote so much of our time and energies. We realize the impressive portion of the relevant knowledge that has been first gained and then applied by individuals working in areas far from our shores.

Since 1906, interested physicians of many nations have been meeting with each other — every few years, except wartimes — to exchange knowledge about occupational medicine. Twelve such organized meetings, identified as International Congresses on Occupational Health, have taken place since the first one in 1906. Only at the more recent of these has the quantitative as well as the qualitative strength of the delegation from the United States given anything like a reasonable indication of the extent of our interest and progress in this science. Undoubtedly, this was in some measure due to the fact that each of the Congresses to date has been in Europe.

Happily, the Permanent Committee and International Association on Occupational Health, which is a group composed of delegates from various countries elected by the Committee, and which has organized the International Congresses on Occupational Health, has accepted the invitation extended by the delegation from the U.S. to have the next Congress, the Thirteenth, in New York in 1960.

Dr. Leo Wade has been elected Chairman, Drs. Leonard Greenburg and Seward Miller, Vice-Chairmen, and Dr. Robert E. Eckardt, Secretary General, of the Organizing Committee for the 1960 Congress. These men have accepted the challenging responsibility of planning this event. They are already engaged in assuring representation of interested groups from the earliest organizational stages, and in making the initial investigations which must be made with respect to exact dates, meeting places, hotel facilities, etc.

Each of us should in turn be anxious to accept such individual responsibility as required to help assure the success of the first such Congress scheduled to be held in this country. We should be prepared to work vigorously in its behalf. Many of us — especially those who can meet conveniently in New York — will undoubtedly be asked to serve upon various committees concerned with the necessary plans and arrangements for the Congress. Cer-

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tainly, we should be glad to do so, and should be willing to contribute all of the skill, energy, and time that we can to the effort.

Each of us should review his own potentialities with respect to the preparation of a paper which might be offered to the Program Committee for consideration for presentation at the Congress.

We should resolve *this early* that no matter what other commitments we make for 1960 we will attend the Congress if it is at all possible for us to do so — and we should persist in this determination unless we have no alternative.

We should face unhesitatingly — and act as required by — the fact that the Permanent Committee has no funds or income with which to finance a Congress, and that, therefore, those responsible for organizing it will need real financial assistance to stage a successful Congress without the type of government subsidy that most previous ones have enjoyed. We must by performance demonstrate that there are many desirable features in our way of organizing and financing such a meeting independently of the government.

Dr. Wade and his staff will exhaust every possibility of keeping this a solvent operation — but it is absolutely inevitable that they, charged with responsibility for a meeting in New York City of the size and calibre desired, will have to appeal — and relatively very early — for industry's voluntary support of this project. We must be sure, when asked by our managements for counsel relative to supporting this Congress, that we shall be able to offer reasonable advice based upon organized thinking on the subject — upon having reviewed the potential advantages of a successful Congress, and the many and disturbing implications of not hosting an outstanding one. —ROBERT T. LEGGE, M.D., Chairman, United States Delegation.

Books

The Impaired Worker and His Needs

THE COMPANY AND THE PHYSICALLY IMPAIRED WORKER: DORIS M. THOMPSON. National Industrial Conference Board, Inc., Reports, 460 Park Avenue, New York 22, pp. 89, $2.50.

Currently this brochure publication may provide the best portrayal of the status of the handicapped worker in relation to further work. Written as it is through the eyes of the employer, the focus is upon the impaired worker himself and his needs. There is no detectable indication of self-serving or self-protection on the part of any company sharing in the study. The coverage is best noted in citing portions of the listed contents:

Who is Disabled?
Reasons for Employing the Handicapped.
Keys to Utilizing the Disabled.
Union Influence on the Employment of Handicapped People.
The Insurance Aspect.
Examples of Company Programs.

All of these major topics are accompanied by many subdivisions. Some gain will come about if one set of subheadings is introduced:

The Insurance Aspect:
Do Insurance Costs Rise Automatically?
How Rates Are Determined.
Company Experience.
Is the Employer Liable for Second Injuries
Inadequacy of Second-injury Laws.
Second-injury Funds in Canada.
Is Industry Taxed with Degenerative Diseas Costs?
Possible Solutions to Compensation Problems
Waivers.
Panels of Specialists.
More Specific Second-injury Laws.
Extension of Disability Insurance.
A More Comprehensive Solution Sought.
Sick Absence and the Cost of Benefit Plans.

The appeal to many may be found in the inclusion of the details of the impaired worker employment programs of 11 major industrial establishments in the country, with mention of Chrysler Corporation and Esso Standard Oil Company, as representative as to size and standing.

Almost at random any portion of this report might be quoted to reflect the whole. Two excerpts are here trusted to serve that purpose:

"Some employers believe that insurance rates inevitably rise as the result of placing handicapped people on the payroll. To refute this reasoning, many insurance companies issue statements assuring companies that this is not true — that their insurance rates are influenced by the relative safety hazards in their operations and their own accident experience. Moreover, many companies cooperating in this study point out that the safety record of their disabled people is excellent and often better than that of their nondisabled employees.

"The possibility of an individual employer being penalized unjustly for permanent total disability when an occupational injury is superimposed upon a pre-existing disablement of an employee is lessened by the inclusion of second-injury provisions in the compensation laws of all but five states and in some Canadian provinces. However, ambiguity of the wording in some compensation laws sometimes results in employers paying claims for conditions that are of dubious job connection and the company may be unable to plead the second-injury law. In other words, this ambiguity in the law may make it difficult for a worker to prove that his disability has either been caused by or aggravated by his work."

"An increasing portion of the American work force is disabled. This is largely due to the fact that people nowadays have a longer life span. The elimination and control of childhood diseases, along with other medical advances and better habits of nutrition, are responsible for more people living longer. But one result of this longer life is the incidence in more people of diseases common to middle and older age. And because medical science is also providing improved controls for these diseases of later life, early death and total disablement are not so frequent as in the past. Consequently, many sick people are able to continue in their jobs as self-supporting citizens.

"Estimates now place the number of physically

handicapped people in the work force between seven and eight million. Of that number, 295,271, exclusive of agricultural placements, obtained employment during the 1956 calendar year. These 1956 placements represent the greatest volume for any peacetime year, and compare with 264,316 in 1955, and 188,079 in 1954."

Reduced to the fewest appraising words, this report achieves its objectives, is factual, thorough, and trustworthy.

Sickness Survey

CHRONIC ILLNESS IN A LARGE CITY — Chronic Illness in the United States, Volume IV: DEAN W. ROBERTS, M.D., Director of the Study. Harvard University Press, Cambridge, Massachusetts, 1957, pp. 620, $8.00.

This elaborate book is the report of the Commission on Chronic Illness, on its study of prevalence of chronic illness and needs for care in an urban community. Its purpose is to present the results of that study. It is the fourth and final volume of the Commission's series of reports, which includes also Volume I, Prevention of Chronic Illness; Volume II, Care of the Long-Term Patient; and Volume III, Chronic Illness in a Rural Area.

Using the extensive resources of a university medical center, a suitable sample of patients was examined to determine the amount and kind of chronic disease existing in the general population. The study found wide deviations from levels and patterns of prevalence suggested by earlier studies which used less exhaustive methods. Nearly 1,600 chronic conditions per 1,000 population were diagnosed in this examination. Prevalence rates were developed for each chronic disease. For example, the prevalence of heart disease of all types was found to be 96 per 1,000 population. The rate for hypertension without heart involvement was 66 per 1,000.

The most gratifying part of this study deals with the fact that there are some persons without any chronic diseases. It is perhaps as important to examine the characteristics of persons who are well as it is to consider those with chronic disease. Thirty-five percent of all persons had no chronic disease, as measured by this study. The most striking fact in this respect is the relationship of age to good health.

The proportion of persons with no conditions ranged from 71% for those under age 15 to only 5% for persons 65 and over. Under age 15, there were more females than males with no conditions; after age 35, the relationship was reversed and there were many more males than females with no conditions. There were no females over age 65 with no conditions. Fifty-six percent of all persons had no substantial chronic conditions. This figure, for all ages combined, varied only slightly for the different color and sex groups except that slightly larger proportions of males than females had no substantial chronic conditions.

Quack, Quack

FADS AND FALLACIES IN THE NAME OF SCIENCE: MARTIN GARDNER. Dover Publications, Inc., New York, 1957, pp. 363, $1.50.

This is the registry of the clotted nonsense of modern quacks, cultists, charlatans, pseudoscientists, and mountebanks in and out of medicine. Much properly falls into the category of "systematized ignorance," and respect is aroused for that fitting word "sciosophy," meaning as it does "shadow wisdom." While the author's stride is as modern as "flying saucers," with which he declines to traffic as even bordering on the scientific, he recognizes that at all times in all countries there have appeared the gullers and the gullible. Omitted by the author is the very beginning in the Biblical "Genesis" wherein Jacob having suffered from some double-dealing at the hands of Laban, his prospective father-in-law, sets in motion a monstrous scheme to make Laban pay, and pay, and pay. Ever shouting his closeness to God and his worthiness of God's favor, Jacob in ostensible self-abasement makes a deal with Laban as to his hire. As the shepherd of Laban's flocks, all Jacob asks in recompense is that the occasional striped or spotted goats and sheep be his, with Laban to have the others. Then the magnanimous Jacob, in the true spirit of quackery, set up about the water holes, piles and poles and trees, all cut with striped and spotted patterns. The breeding cattle, in Jacob's wicked conceits, seeing much about them in stripes and spots would bring forth their own kind so spotted and so striped; Jacob not overlooking the advantage of using the spotted and striped males as sires. And so it came about that soon Jacob had all the flocks and Laban nothing. There may be honor among thieves, but none is expected among quacks.

But the author misses little else, and finds place for the infamous William Koch, the potentially true scientist, turned quack and greedy; for Bridey Murphy and all her rot; for the psionics machines and all their variations. Knowing the fullness of the world with the gullible, the miracle is that there are so few quacks. Tell most any man the distance to the moon is 240,000 miles and he believes without debate; tell him in bold printed letters "Wet Paint" and he rushes over for smeared fingers as proof. The gullible and the quacks richly deserve each other.

Perhaps every community needs one well-labelled quack. It makes all honest men and women feel ever so much more virtuous, at least after they have disposed of the jealousy over the coin that ever flows to the quackish apostles of greed. Fame may come to these preying beasts, but never glory; but fame soon ends and glory is posthumous. Within every hundred or so charlatans or so-styled charlatans, there may be one true genius, warped or not yet in bloom. The medical profession's mistreatment of Semmelweis is so close as still to slash scars.

This book is the perfect antidote for a reading of "Host Variations in the Size of Hepatitis Virus," or any such pontification.

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INDUSTRIAL MEDICINE AND SURGERY

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Occupational Health Introspection and Prospection

THE ART of cogitation should be persuasive toward the harnessing of imagination to reality, so that acceptance of unwanted things as they are may give way to good things as they could be. As this period of the year strong is the motivation to take stock, to make inventory, to appraise the state of many things. As to occupational health, just a little growth could achieve mighty betterments. Here named are 10 soft spots in occupational health's wall of Jericho that cogitation's trumpeting calls for strengthening. Strengthening would appear IF:

— Every physician, surrounded as he is by an exploding industrial culture, might realize that he is a part of occupational health and may make contributions regardless of his professional work or specialty.

— Every physician, knowing that he is part of occupational health, might enhance the value of his services to industrial workers by an enlarged knowledge of industry itself, in its peculiar requirements as to medical services to its workers.

— The half visible, half submerged need for 5000 more skilled physicians in industrial medicine in the United States alone speedily might be met by that many taking their stand alongside the 9000 already serving directly in plants, happily accepting a fair share of the honorable burdens, and happily participating in the drama of medicine in the country's fantastically ramifying industry.

— Occupational health might overcome its appalling shortcomings in the investigations within its immediate and obvious needs. A myriad of untouched materials, chemicals, machines, and processes beckon for the investigator's exploration. Already the lag is near to 50 years. Far more newness appears every year than is brought to understanding. If all the technical facilities of the land were concentrated alone on pesticides and their kind for 10 years, all that is now unknown could not be brought to the known.

— Every worker realized that in no small degree his health is his personal matter and responsibility, so that a tremendous inner urging would prompt his better utilization of heavensent measures designed for his acquisition of good health and its conservation.

— Occupational health might be served by scientific journals which — in, of, and by themselves — would manifest and assert leadership.

— Organizations within occupational health, through some miracle, might cast off the thralldom of budgets, politics, bickering, the hewing of wood and the drawing of water, all to the end that there might be time for the attainment and fostering of medical statesmanship.

— "Justice" might find its way into the compensation courtroom and not remain as it does — as to labor compensation — just a word in the dictionary. An enormous deterrent to occupational health's flowering relates to "facts" in the compensation courtroom ever being on the gallows, and "wrong" sitting in the chair of referees and judges and juries.

— World affairs might be stripped of their ceaseless flow of new and recurring tensions and stresses, so that the days and the nights may not be made hideous by distorting neuroses and wracking anxieties being thrust into the

industrial dispensaries. The threatening swashbuckling of any tyrant anywhere may add to the dispensary attendance in any plant, by emotionally-warped industrial workers. Already this land is being invaded by word missiles skillfully targeted onto emotions.

— The great gift might be given to all industrial physicians, all industrial nurses, all industrial hygienists to grasp that in occupational health they are playing stirring roles, with acclaim and distinction awaiting all who strive mightily and constructively.

Principles of Planning

LEADING off the New Year, and beginning on page one of this Journal's Volume 27, is the first section of Dr. William J. Fulton's treatise on the planning and design of industrial Medical Departments. This is in four sections. The first, in these pages, analyzes the work performed by the Medical Department, and classifies its functions. The second, to appear in February, applies the principles and conclusions developed in the first section to a proposed layout plan submitted for editing and comment prior to final approval. The third, scheduled for March, reconstructs the proposed plan in the light of the principles of functional layout developed in Section I. And the fourth, due in April, demonstrates that the fundamentals derived from Section I can be applied to advantage in the planning of Medical Departments of all sizes from the largest to the smallest.

Strong is the temptation to herald this magnificent work as one of the most important contributions ever made to the science of industrial medicine. Nearly a quarter-century in preparation, and dealing with problems which have echoes of various intensities in practically every existing Medical Department, it is all of that. But we choose to let it prove itself.

No doubt it will occur to many readers — as already it has occurred to several enterprising publishers — that this material might well be a commercial success in book form. But in the finest tradition of medicine, its author insists that no one shall have any opportunity to profit from its sale, but that everyone shall be welcome to profit from its use. Hence it is the privilege of this Journal once again* to be the medium through which a masterpiece of analysis by Dr. William J. Fulton is made available to all who may find advantage in its application to their needs.

With considerable pride, and a pardonable degree of enthusiasm, we commend the present study to our readers.

*See "Records — The Seeing Eye of Industrial Medicine," *Indust. Med.* 13:1, 1 (January) 1944.

Less General — More Specific

YEARS ago — in times B.D. (before diesels) — a convention of the railroad men who officially were concerned with fuel and its consumption devoted a program to coal-saving improvements in locomotives. One after another the speakers proposed alterations — in boiler design, cut-off timing, draft regulation, methods of firing, etc. — claiming for each that it would effect a reduction in the amount of coal burned. This improvement would save 10%; that one, 8%; a third, 11%, and so on. In mid-afternoon the program was still steaming ahead when the representative of a railway publication interrupted to suggest that it might as well stop—nothing more was necessary — it had been sufficiently demonstrated that a locomotive equipped with all of the fuel-economizing measures up to that moment described would run without fuel — already the coal savings assured by their use totaled 117%.

THERE are hints that a similar denouement may be lurking among the published statistics on the causes of absenteeism. Consider the following quotations:

1. "Thus 92.9% of all work absences for men, and 95.4% for women, are due to sicknesses, the control and reduction of which are almost completely the responsibility of the worker."

2. "In 1954 at least 25% of our long-term absences were the result of our doctors' recommendations."

3. "As high as 30% of the workers who take sick leave suffer from emotional instability rather than physical ailments."

4. "Necessary personal affairs account for 15% of the total amount of time off."

5. "Traffic accidents are a big factor in absenteeism. They cost more time than any other type of off-the-job accident."

These are quotes at random from recent contributions to the literature. They are not all-inclusive. Occupational diseases, "evasions of adulthood," off-the-job accidents, "laudable" absences, for example — all definite factors, however small — are not counted. With these, and no doubt others, omitted, the quoted percentages thus should add up to less than 100. But that is to assume that all of the 25% of long-term absences resulting from "doctors' recommendations," together with the 30% due to "emotional instability rather than physical ailments," are among the "sicknesses the control and reduction of which are almost completely the responsibility of the worker." Obviously, however, they are not; some, at least, are outside of the "92.9% for men, and 95.4% for women." And the "necessary personal affairs," neither few nor infrequent — such as family illnesses and accidents, child care, house-

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hold responsibilities, court appearances, jury service, funerals, transportation difficulties, weather conditions, the competition of personal interests and desires, etc., etc. — all are outside. And traffic accidents are certainly not "sicknesses."

So, "for men," the total seems to develop as embracing: 92.9%, *plus* a substantial part of 25%, *plus* a substantial part of 30%, *plus* 15%, *plus* x(traffic accidents — "big factor"). This total definitely cannot be kept within 100%. Nor can any other summation of the kind.

A SURVEY of the literature on absenteeism, to list and add up all the percentages attributed to its unduplicated and nonoverlapping causes, ought to prove entertaining to say the least. The resultant total almost certainly would be confusing; it might even be fantastic. Rather than that such a survey be undertaken, perhaps it would be better to put this whole percentage business under "security" restrictions, and not let it get out. Suppose it were to become noised abroad so as to reach the ears of the supervisory people. Imagine the dilemma some morning when the man in charge discovers that the absenteeism among his group — in terms of the attributed percentages of causes — amounts to 200%. Shall he believe that half of those he doesn't see at their work are actually there? Or will he conclude that an equal number of those he does see are really home in bed? Such things could increase materially the percentage of absenteeism among supervisors!

THE foregoing is more than a *reductio ad absurdum*. It is a mild injunction to moderation — in estimates, in emphasis, and in enthusiasm — and to less general acceptance of statistical figures as applicable merely because of their previous publication. The terms "illness" and "sickness" too often are only euphemisms. And the distribution of percentages in one employment situation almost never matches that in another. Instead of so many panel discussions, and surveys, and articles on absenteeism due to "nonoccupational illness," and the like, why not recognize that "illness" and "sickness" are greatly overplayed, in name and in fact, and study the subject in terms of the actual — never the imputed — cause of each individual absence. In other words, treat absenteeism more as a matter of people, less as a matter of percentages. This not only might straighten out a lot of woolly thinking on the problem, but also could channel a vast deal of energy more effectively toward measures of correction.

Which Are They?

UNIVERSITY of Michigan's Institute of Industrial Health has annual conferences called "Selby Discussionals," in honor of Dr. Clarence D. Selby who inaugurated the custom of holding the conferences and coined the term "Discussional." The sessions are informal, and nothing that is said is recorded. In the sense that discussion is argument, these meetings are discussion at its best. There is no arbitrator, no referee, no decision — but everybody wins because the whole occasion is a stimulant to the kind of thinking that too many of the problems of industrial medicine don't often get. Typical of the questions discussed — or argued — is this one, posed at the Ninth Selby Discussional, December 6-7, 1957: "Are employee inoculations — such as for Asian flu — prevention or treatment?"

Safety Rules for Offices

THOUGH on-the-job accidents are most frequently associated with factory operations, they take their toll in offices, too. Following are some tips for reducing the hazards: (1) individual upright filing cabinets should be secured to the floor or to the wall and, where there are two or more, should be bolted together; (2) desk drawers, file drawers, and desk slides should not be left open. These can cause serious injuries when a person inadvertently strikes or stumbles over one of them; (3) running or hurrying while opening the doors in hallways leads to accidents, since it is usually impossible to determine whether another person is about to enter; (4) loose linoleum or carpeting may lead to falls — so may highly waxed floors; (5) razor blades should never be left loose in desk drawers, nor should broken glass be placed in wastebaskets; (6) closing disappearing typewriter desks without using the handle provided for that purpose may cause hand injuries; (7) material precariously stacked on top of lockers, filing cabinets, and other high objects can injure bystanders if it tumbles off; (8) highly flammable material or liquids stored in lockers or cloakrooms are conducive to fires; (9) lifting loads improperly or lifting heavy loads causes back injuries; (10) women should not attempt to move standard typewriters or other heavy office equipment unassisted.

—*Supervisory Management*, December, 1957.

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